AMERICAN AVIATION

November 17, 1958

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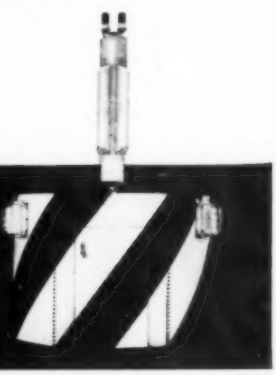

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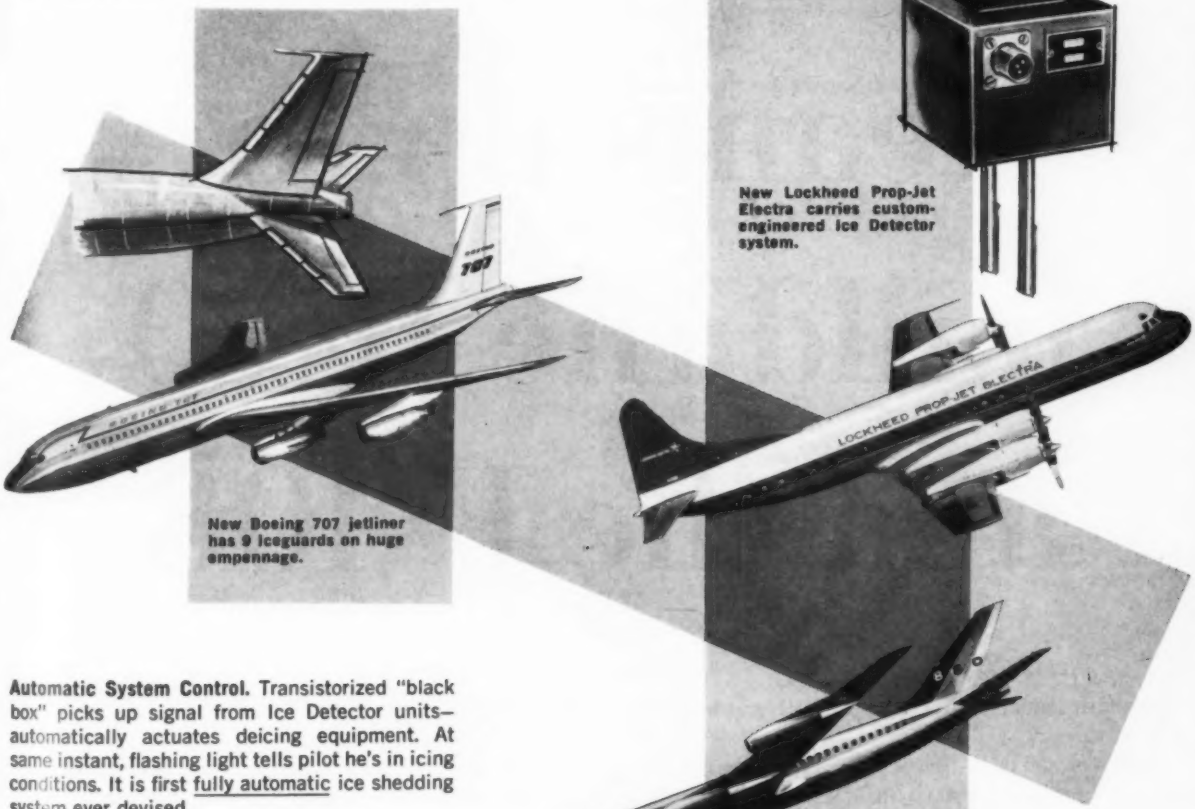

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The F-108 and the B-70 will be the first of the new generation of manned weapon systems. No military airplane in the world today even approaches their performance.

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Each major contractor will be responsible to the Weapon System Manager for *everything* about his system, from engineering through construction. In every case he will sublet contracts for engineering and components to other companies, large and small. He will deliver his system to the prime contractor, North American Aviation, who in turn will deliver the complete weapon system to the Air Force.

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The Los Angeles Division of

North American Aviation, Inc.

AMERICAN AVIATION

NOVEMBER 17, 1958—VOL. 22, No. 13

WORLD'S LARGEST AVIATION PUBLISHERS

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"Already, our design groups plan the supersonic jet transports of 1965. Meanwhile, new speed and altitude records set by a Lockheed F-104 Starfighter move manned flight to the fringes of outer space.

"Within and beyond lie many problems for our engineers: problems in aero and thermodynamic characteristics at supersonic speeds, in radar, in optics, in infrared and data processing for airborne detection systems. Additional long-range problems exist in military systems analysis, nuclear and space craft systems, commercial air transport studies, and industrial operations research.

"There are openings now for thoroughly qualified electronics and aero-thermodynamics engineers and operations research specialists.

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Opportunity for Reappraisal

The resignation of Brig. Gen. Milton W. Arnold as vice president-operations and engineering of Air Transport Association comes at a crucial time when the task of representing airline interests in various governmental dealings with upcoming jet operations has assumed unprecedented proportions.

The big problem now facing ATA's membership in the replacement of Arnold is one that should not be taken lightly. This is the time and the opportunity for a thorough reappraisal of the many and important responsibilities centered in that single office of v.p.-operations and engineering. At the top of the list are air traffic control, air navigation, airspace, and anti-collision development chores. Heaped upon these are communications coordination, engineering and maintenance, aircraft performance, airworthiness regulations, safety coordination, supply and purchasing.

What the airline managements should carefully weigh here and now is the new significance that many of these functions have assumed with the introduction of jets and turboprops. Jet performance regulation can mean the difference between airline profit and loss. Bad airport design can become an intolerable economic penalty for carriers as may well be proven by the mistakes being paved at Chantilly, Va. The importance of top-level treatment of air traffic control matters cannot be overstressed. In short, the responsibilities focused in this one office of ATA have outgrown the ability of a single individual to do justice to them. Now is the time for ATA to consider appointment of a separate v.p.-operations and a separate v.p.-engineering and maintenance. To find a replacement for Milt Arnold will not be easy, but such a new division of responsibility will derate the qualifications from superman levels to an area of reason where good talent is available to do a good job.

The ATC, airports, communications, navigation and airspace problems logically fall together and would be a full-time task for a v.p.-operations. The engineering and maintenance problems, which so vitally influence economics in the turbine transport era, can no longer be given a stepchild treatment either by the airlines or ATA. Here, too, there is some topflight material available to fill such a post in the likes of Marvin Whitlock of American, Bob Rummel of TWA, Charlie Froesch of Eastern and John Borger or Bob Moore of Pan Am, to name but a few. It would take some deep thought on the part of the airline asked to part with any one of these logical choices at this critical period in their jet planning, but the great benefit to be gained must be examined closely.

The airlines and ATA can ill afford to leave vacant for long the post occupied by Milt Arnold, but neither can they afford to act too hastily. The important thing is that they take advantage of the present opportunity to reappraise the basic organization of ATA to be certain it is geared to handle the problems of tomorrow.

No Time for Complacency

The rollout last month of the North American X-15 research aircraft marked the third big October event in the progress of U.S. airpower to hold its position as the best in the world. In October 1947, the Bell X-1 flew through the sound barrier as another milestone and in October 1953, USAF unveiled its first production model of a supersonic fighter with the introduction of the F-100 Super Sabre.

In retrospect, the U.S. may have been first in each of these areas, but the margin in time was not very large. The Soviets were only a year behind the X-1 in supersonic flight and an even shorter period in achieving an operational supersonic fighter in the MiG-17. With these facts a matter of history and the evidence of the real push by Russia to outdo the Free World in these areas, it is a good bet that the Soviets are right with us in the development of a vehicle that will match, perhaps better, our achievement in the X-15. More certainly, this is no atmosphere for complacency. To the contrary, it should prove good food for thought by our Defense planners in their budget-dominated apprehensions concerning the need and value of a strong research and development effort.

A Good Step . . . But

The decision by the USAF to award a contract to North American Aviation placing the Sabreliner utility jet into production is to be commended. But it is only part of the job that should be done. Department of Defense officials should immediately follow suit with a limited production order for the other two utility jets, Lockheed's JetStar and McDonnell's Model 119. There are occasions when a relatively small amount of military spending can be turned into a real bonanza for the U.S. aircraft industry, and hence the entire defense effort, and the utility jet program is a perfect example. It is about time that the Defense Department nudged these projects on their way, and, if action doesn't come soon, Congress should step in and take a good long look at the whys and why nots of Pentagon stalling on this potentially lucrative aircraft production program. There is so much to be gained and so little to lose that further procrastination is inexcusable.

Joseph S. Murphy

The regular editorial contributor to this page, Wayne W. Parrish, is currently on an extensive trip through Europe, Poland, the Soviet Union, Afghanistan, and India. In his absence the page will be written by Joseph S. Murphy, Executive Editor.

ADVERTISEMENT

Veteran test pilot Fisher gets 707 flight test checkout from long-time friend Tex Johnston, Boeing Chief of Flight Test.

Noted test pilot gives a behind-scenes operational report on America's first jet airliner . . . another in Champion Spark Plug Company's series on aviation history in the making

FLIGHT TEST, 707!

by HERB FISHER
International aviation authority, veteran test pilot, author

The 707 seats 112 to 180 passengers. New York to London, 6½ hours! Pan American starts first jet service to Europe this Fall.

That "greatest-yet" moment in American aviation history—dawn of the commercial jet age—stands at zero hour. Pan American has just taken delivery on the first of 23 Boeing 707 turbojets. Other airlines will put Douglas, Convair and Boeing turbojets in service in the months to come. It's been a long count-down . . .

The 707, designed to cut existing passenger schedules in half, was first flight tested on July 15, 1954. A transcontinental speed record was almost automatic—Seattle to Baltimore, 3 hours, 48 minutes; cruising speed, 612 mph.

As a test pilot who's flown about every type of transport including the 707, I'll say right now it's impossible to describe the performance difference between the 707 and conventional aircraft. The 707 is a pilot's dream as well as a passenger's. It's easy to fly. Its performance is superb . . .

You flick a switch. Champion jet igniters fire three- to four-inch bursts into the combustion chambers every second for 30 seconds. The 112- to 180-passenger aircraft comes alive instantly. No warm-up necessary. Flight test is on.

Releasing brakes for takeoff, you realize in an odd moment of pride-spiked humility that your finger tips command $5 million of precision-built aircraft—and 60,000 pounds of thrust that's going to ram skyward *a mass nearly twice the weight of today's big propeller airliners.* The 125-ton ship breaks ground at 150 knots. You feel a surge as retracting land-

ing gear and flaps reduce drag. Soon you're at 300 knots indicated. Your rate-of-climb is more than double that of present-day aircraft.

I climbed to 35,000 feet in 13 minutes.

Cruising at 600 mph between 30,000 and 40,000 feet—well above weather and where jets perform best—you sit back, smile, look around. Absence of piston-engine throb delights you. There's practically no vibration. You hear turbines whine but faintly. Aft, passengers will hear only a faint whistling, will not be buffeted by ordinary turbulence.

You check your 20 engine instruments again. It's quick and easy: All needles are parallel during normal operation. All the pilot need do is watch for a needle off parallel!

Pilots, the simplicity and honesty of jet control is like a prayer answered. Gone are prop synchronizer, supercharger, cowl-flap, mixture, carburetor-heat and prop-pitch controls and mag switches. Primary flight controls are 100 per cent manually operated. No power-boost. Spring tabs cable-connected to wheel and rudder pedals actuate controls. Internal pressure balances provide low control forces for low-speed maneuverability and higher forces for high speeds where abrupt maneuvers aren't desired. End result—"natural" feel. No sluggishness, no over-sensitivity.

Mid-span, high-speed ailerons supplemented by hydraulic spoilers and (when flaps are down) use of outboard, low-speed ailerons simplify lateral control. This permits safe operation from airports with a 90° crosswind of 30 mph, and the spoilers provide speed brakes for a wider choice of approach angles.

Power control is simple as a broom handle. A single lever mechanically connected to a hydro-mechanical regulator on the engine slows and speeds the plane. Fuel-air ratios take care of themselves.

For dual reliability, each engine has normal tank fuel flow plus two independent electric boosters. Engine-driven pumps feed fuel if the electric pumps are lost. In emergency, a manifold line may draw fuel from any tank. Likewise, the 707 has two independent hydraulic systems for actuation of spoilers, flaps, landing gear, nose-gear steering and brakes.

Even over air-turbulent Mt. Rainier, 707 passengers will experience but slight, springy motion.

You put the 707 through her paces. Then—the crucial moment: *You simulate flameout*, though chances of it happening are slim. Engine is dead. And the life-trigger—the jet igniter—has been in this jet furnace *enduring temperatures of thousands of degrees for hundreds of accumulative flight-test hours* . . .

Flameout. You take comfort in the knowledge that Champion's long history of spark plug development includes *unique* know-how with jet igniters dating back to the birth of experimental jet engines—those built by General Electric in wartime 1943! And that Champion was first with jet igniters in military aircraft—and has held that lead since . . .

You flick the switch. Two jet igniters spit lightning into the dead turbine. The big Pratt & Whitney engine flashes to life.

Flight test secure, you descend comfortably at 10,000 feet a minute. With speed brakes, single-motion power control and provision for lowering wheels at cruising speed, slow-down distance is but *two miles*. Go-around safety is assured. The big ship maneuvers easily in the traffic pattern.

The 707 goes into service as the most thoroughly tested airliner in history, Tex Johnston, one of the great test pilots, tells me. It's backed by 24,000 hours of wind tunnel testing, 1,500 hours of flight testing—plus the performance record of its military counterparts.

Likewise has the reliability of the vital Champion jet igniter been established—15 years of testing and performance in military aircraft operating under grueling conditions, four years in exhaustive 707 flight testing. Champion's depth of experience and demonstrated ability to make metal and ceramic parts capable of perfect functioning in fantastic temperature ranges led Pratt & Whitney to Champion when the J-57 engine was being developed. A jet igniter must not only be capable of re-igniting the turbine at critical altitudes and speeds, it must deliver instant starts on takeoff day after day.

Today Champion is teamed with engine manufacturers in advanced jet engine development and remains the greatest volume producer of jet igniters in the industry—hence the superior igniters at much lower competitive costs.

Tomorrow . . . well, this is *it* for Pan Am, American Airlines—and the 707!

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. . . *salutes the Boeing Airplane Company*

Airframes in assembly at Renton, Washington. Boeing takes extra pains with 707 airframe structural safety and endurance.

Fisher and Rudolph Blazek, Experimental Pre-flight Foreman, inspect Champion jet igniter in 707 turbine.

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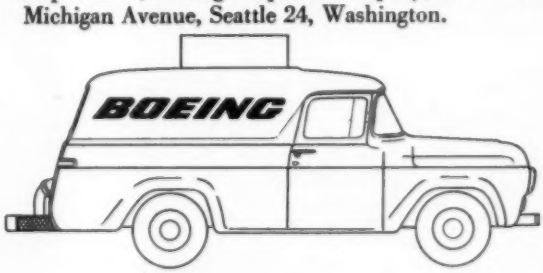

←——Circle No. 102 on Reader Service Card.

Contracts to Watch

Two important contracts go to North American Aviation, Inc. from the Air Force.

One provides the green light for production of the T-39, twin-jet utility trainer. First procurement is for about 10 aircraft. Dollar figures have not been disclosed. Schedule calls for about two planes a month in early fiscal 1961. Plane is powered by two General Electric J85 high-thrust-to-weight engines, with a range of about 1,500 miles and a speed of about 500 miles. Cost per aircraft has been figured at $1.4 million per unit.

The second contract is for $9.1 million for research in supersonic environment for Phase I development of the B-70, Mach 3, chemical bomber. North American is now asking for subsystem development proposals.

Aircraft Subsystems (F-106):

Beech Aircraft Corp., Wichita, Kan.—$7 million Convair Division of General Dynamics Corp. contract for follow-on production of the aft-fuselage section and other major subassemblies for the F-106A and F-106B.

Hughes Aircraft Co., Culver City, Calif.—$16,236,469 AMC contract for aircraft and weapon control system MA-1.

Sundstrand Machine Tool Co., Rockford, Ill.—$2,763,885 AMC contract for F-106 components.

Airborne Electronics:

Lockheed Aircraft Corp., Burbank, Calif.—$8,274,538 Navy contract to install Julie and Jezebel Systems in 96 P2V-5F/7 Neptunes—$38,306 AMC contract for guidance in development of time division data link for F-104.

Ryan Aeronautical Co., San Diego, Calif.—$20 million Navy contract to produce radar navigation equipment for the Lockheed P2V Neptune, Martin P5M Marlin and Douglas A3D Skywarrier.

Bendix Aviation, Ann Arbor, Mich.—$4,582,000 AMC Phase I contract for AN/AMQ weather reconnaissance subsystem. Boeing Airplane Company is a partner in the program.

Aircraft and Simulators:

Boeing Airplane Co., Seattle—$52 million, AMC contract, spare parts, ground support equipment and data; $1,250,000 AMC contract for KC-135A, Type MB-26 flight simulators, spare parts, etc.

Cessna Aircraft Co., Wichita—$12,345,000 AMC follow-on contract for T-37 jet trainer

North American Aviation Inc., Los Angeles—$2 million AMC contract for F-100F aircraft and spares.

Nuclear Products, Erco Div., ACF Industries, Inc., Riverdale, Md.—$1,619,658 AMC contract for C-105D flight simulators, spares, etc.

Propulsion Equipment:

General Electric Co., Evendale, Ohio—$39,369,000 AMC contract for continued development of an aircraft nuclear propulsion system in accordance with the program started in 1951.

External Tanks:

Beech Mfg. Co., Kansas City, Mo.—$3,280,000 contract for production of type 4 external jettisonable 3,000 gallon fuel tanks for the C-132.

Airport Lighting:

Rome Electric Mfg. Co., Chicago—A Rome Air Force Depot contract for $210,518 for airport taxiway light markers.

General Electric Co.—$1 million contract from Civil Aeronautics Administration for airport lighting systems power and control equipment to be installed at 71 major airports.

Maintenance and Overhaul:

Aircraft Engineering & Maintenance Co., Oakland, Calif.—$772,376 AMC contract for technical order compliance on T-33A aircraft; $189,559 San Antonio Air Materiel Area Contract for progressive aircraft reconditioning cycle (PARC), technical order compliance and repair of 17 C-131 A/E aircraft for MATS.

Flight Enterprises, Inc., Windsor Locks, Conn.—$1,052,870 AMC contract for reconditioning 25 C-121C aircraft for MATS.

General Electric Co., Evendale, Ohio—$12 million AMC contract to rebuild 165 J47 and J79 engines monthly over a 12-month period.

Intercontinental Mfg. Co., Inc., Brady, Tex.—$56,637 AMC contract for reclamation of 24 R-1830-90C/D-92A aircraft engines.

North American Aviation, Inc., Los Angeles, Calif.—$176,000 AMC contract for complete rehabilitation of four RF-100A aircraft.

Propellers:

Curtiss-Wright, Propeller Division, Buffalo, N.Y.—$3,051,747 AMC contract for C-133B propeller assemblies, components and spares.

Ground Electronics:

Burroughs Corp., Detroit, Mich.—$22,817,800 AMC contract for coordinate transmitter sets in accordance with MIL-T-4664 dated Sept. 6, 1957, and AF Bulletin 98 dated May 7, 1953, as amended Aug. 21, 1953.

International Telephone & Telegraph Corp., New York City—$6 million AMC contract for Strategic Air Command Control System.

Radio Corporation of America, Camden, N.J.—$6,444,831 AMC contract for ground electronics.

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AIRTRENDS

Air Force wants to find a new way of forecasting material requirements 10 years ahead. Reason is that there is a very real requirement for funds for the development of manufacturing and fabricating techniques permitting the use of new materials.

Look for a new investigation by Senator Lyndon Johnson's (D-Tex) Senate Armed Services Preparedness Subcommittee into the recent charges that the U.S. is or may become a second class power.

Air Force Flight Safety Directorate will watch all B-47 accidents carefuly in an effort to determine whether the "Milk Bottle" program has made the necessary fix. So far, reports indicate that accidents which have occurred since the "fix" do not involve the structural repairs already made.

Election results make certain a new effort by the Congress to provide small business with a bigger share of the defense dollar by changing the procurement rules.

AMC will issue a regulation designed to cut back on reports which contractors are now being forced to make. Effort is to save both manpower and dollars.

Marriage of subsonic aircraft and high-speed missiles as a solution for air defense headaches is now being predicted by the Navy. Forecast is for relatively slow, heavy aircraft, capable of staying "on station" for long periods. They would be capable of tracking more than one attacking bomber or missile and would carry a variety of weapons. First of such aircraft would be jet or turboprop powered. Later versions might use nuclear power—if the state of the art permits.

Army demands for more airlift earmarked for STRAC use may be met with the defense that fewer aircraft would be needed if the Army got on with the job of developing weapons and equipment using light metals.

Reliability is the Defense Department's most important headache. Worry is that Congress may ultimately say: "Since you can't make it work satisfactorily, why provide dollars."

Air Force, in an apparent answer to charges that Government-owned facilities give some contractors an unfair advantage, is increasingly anxious to dispose of excess facilities even though they may not be excess to current production requirements.

Machine tool builders will push for inclusion of tools under the protection of "Buy American Act," claiming that the Pentagon is buying an increasing number of tools overseas, to the severe injury of the industry which is frequently described as "the last bottleneck" in any mobilization effort.

Congress may be asked to take a "new look" at the share of dollars being provided for strategic deterrence of war as compared with air defense and tactical war, as the belief grows that future wars are most likely to be limited engagements, rather than full-scale all-out atomic wars.

Navy will order a follow-on to the Grumman WF-2 early warning aircraft. The new plane W2F will be bigger and "more sophisticated" than the aircraft now in production.

Target date for introduction of the Lockheed P3V's into the fleet is 1961 or 1962. For the future, Navy wants "longer range or more endurance, more power and speed; all-weather capabilities and improved armament and electronics" for antisubmarine aircraft.

Aircraft industry will sell some 4,000 aircraft units to military in 1958 as compared with more than 10,600 in 1953, a reduction of more than 50 percent in five years. However dollar value of sales is climbing.

Facilities problem is becoming a major industry headache, as requirement of space for production quantity of aircraft is reduced. Question arises as to what ought to be done with excess facilities at a time when new and specialized facilities are becoming increasingly important.

AIRTRENDS

Look for domestic aircraft manufacturers to increase their interest in overseas licensing arrangement. Such arrangements might encourage the foreign country to buy one or another aircraft depending on terms. Lockheed is making licensing arrangements with the West German Government, which will permit the manufacture of some 300 F-104 Star Fighters in Germany. It has expressed interest in working out licensing arrangements with the Australian Government. Other companies are likely to follow suit.

Grumman is in good shape as far as the Navy is concerned. In addition to building the F-11F, it is building the WF-2 antisubmarine aircraft and the A2F-1 attack aircraft, even though it lost out in the competition for West German business to Lockheed.

Aircraft companies will find the Air Force cranking new maintainability and maintenance standards into contracts for new planes, since maintenance failures are taking the rap for an increasing number of major accidents.

So-called sonic failures of materials are worrying both the manufacturers and the military. All-out effort to lick the difficult problem can be expected soon.

Development of a new three to six inch plate in high-strength alloy 7079 by Aluminum Company of America will broaden the application in jet aircraft for bulkhead assemblies and integrally stiffened wing panels of light metal. Key to the development is a new press-roll technique.

Number of foreign operators choosing the Conway engine to power their 707 and DC-8 fleets shows the growing interest in by-pass type engines. The British approach has been to duct air around the engine with a pressure boost from a large-diameter low-pressure compressor, and running combustion temperatures about 150 C higher to attain same thrust as straight jet of same diameter. In this way, British designers claim a 20% weight reduction with an increased aircraft range of about 5%. Also, they claim less noise due to the lower air velocity through the engine. Development in this country has been largely in the area of ducted fans. In this design, a separate by-pass air compressor is provided, and there is no mixing of fan air and jet exhaust before ejection.

New inertial guidance systems designed for military aircraft will take the guesswork out of navigation, particularly on long over-the-water flights and make possible improved early warning aircraft. Development will ultimately be picked up by civil airlines.

Growing use of titanium can be expected now that the price of sponge has been cut to well below $4.00 a pound. Producers believe that the price differential in favor of steel is offset by the lighter weight of titanium.

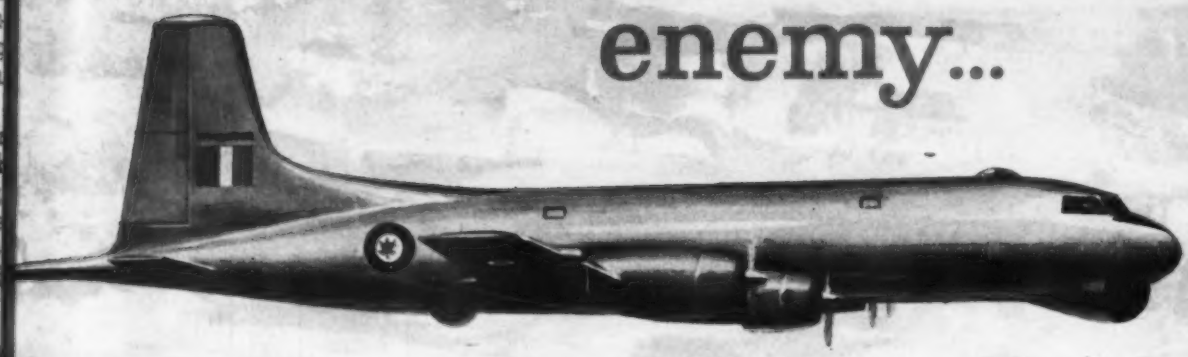
Possibility of building a transport prototype version of the Martin P6M for Army airlift is being explored, even though current economy moves may scuttle the project.

Board of Governors of Aircraft Industries Association can be expected to take a strong position on need for changes in the Renegotiation Act when it meets in Phoenix, Arizona, late this month.

Some aircraft manufacturers are asking whether it isn't feasible to make sure representatives from their home states are on Congressional Committees which deal with defense, appropriations and commerce. Theory is that these key committees ought to have the advantage of the specialized knowledge of problems and conditions which come to home-town members of the Congress. However, since seniority rules govern committee assignments, the idea is not likely to bear fruit at this time.

Dollar amounts of first UTX (T-39) production should be decided before Christmas when Air Force and North American Aviation are expected to sign a formal contract. In the meantime, flight tests and configuration studies are being made.

To seek the hidden enemy...



A NEW DIMENSION IN SEA SAFETY!

The Canadair CL-28 is the most formidable search, strike and kill maritime patrol weapon in the air today. It is in quantity production for the Royal Canadian Air Force and is available for purchase.

The CL-28—a direct derivative of the Bristol Britannia—carries the most comprehensive collection of electronic and other detection equipment ever assembled into one aircraft for locating, tracking and "fixing" enemy submarines—whether submerged, 'snorting,' or on the surface. Once contact is made, torpedoes, depth bombs and other offensive weapons are released.

It was specifically designed for long periods of ocean patrol duty . . . tactical co-ordination with naval surface craft on defensive and offensive manoeuvres . . . convoy and search-rescue operations.

The CL-28 will meet or surpass the requirements of friendly countries responsible for the defence of coastlines and sea approaches.

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Limited, Montreal, Canada

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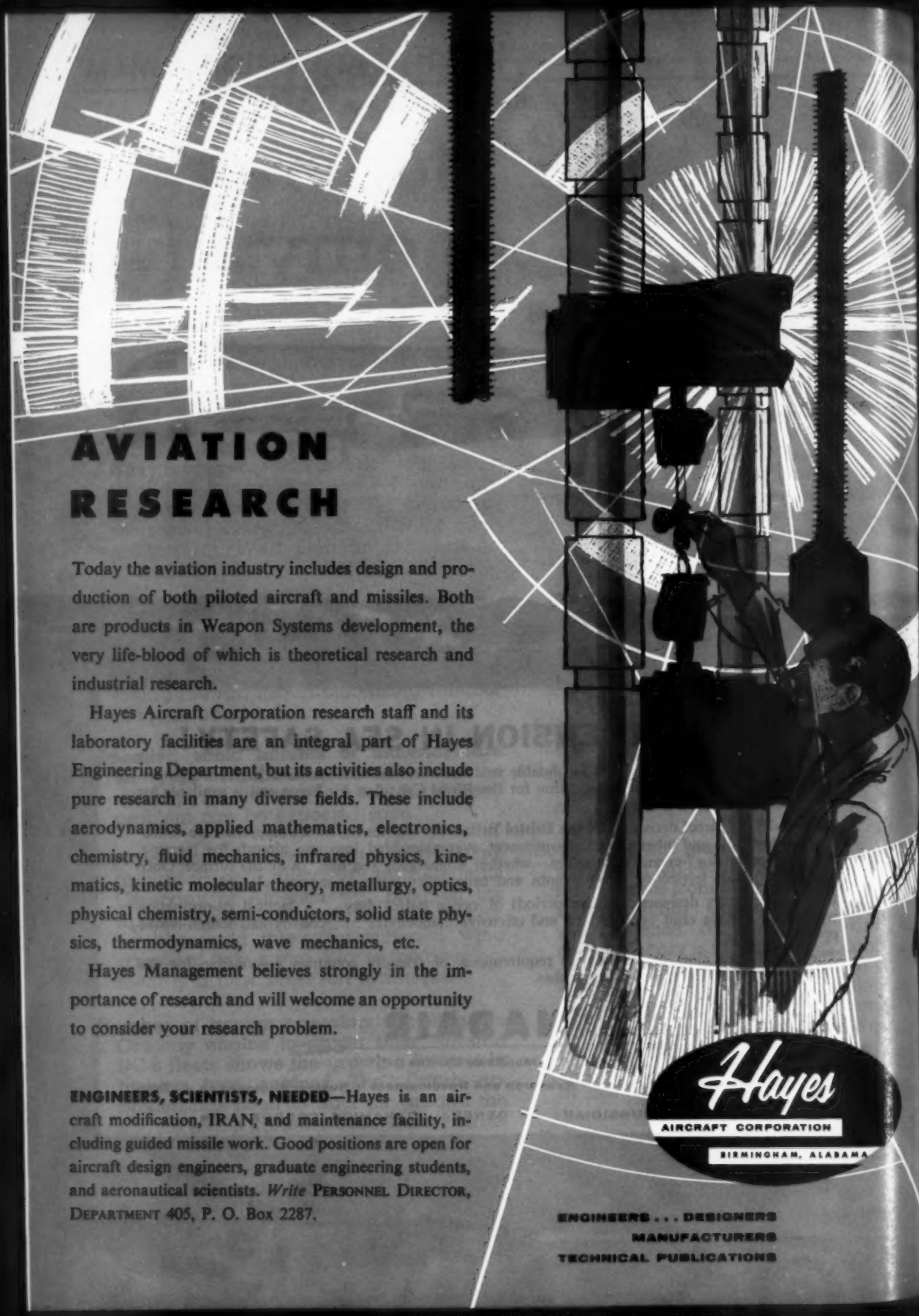

AVIATION RESEARCH

Today the aviation industry includes design and production of both piloted aircraft and missiles. Both are products in Weapon Systems development, the very life-blood of which is theoretical research and industrial research.

Hayes Aircraft Corporation research staff and its laboratory facilities are an integral part of Hayes Engineering Department, but its activities also include pure research in many diverse fields. These include aerodynamics, applied mathematics, electronics, chemistry, fluid mechanics, infrared physics, kinematics, kinetic molecular theory, metallurgy, optics, physical chemistry, semi-conductors, solid state physics, thermodynamics, wave mechanics, etc.

Hayes Management believes strongly in the importance of research and will welcome an opportunity to consider your research problem.

ENGINEERS, SCIENTISTS, NEEDED—Hayes is an aircraft modification, IRAN, and maintenance facility, including guided missile work. Good positions are open for aircraft design engineers, graduate engineering students, and aeronautical scientists. *Write* PERSONNEL DIRECTOR, DEPARTMENT 405, P. O. Box 2287.

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AIRCRAFT CORPORATION
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ENGINEERS . . . DESIGNERS
MANUFACTURERS
TECHNICAL PUBLICATIONS

—LETTERS—

"A Lot of Nonsense"

In going through an old issue of your magazine (April 7, 1958), I came across a letter to the editor written by a Mr. Goodwin in which, in commenting on Armed Forces overhaul and repair work, he censures you for irresponsibility, inaccuracy and absurdity.

Naturally one judges any article or letter by what one already knows; and therefore, as a civilian test pilot earning considerably less than half of the $25,000 salary imputed to me for test flying one of the Armed Services' more expensive airplanes, I can only conclude that Mr. Goodwin's entire article is a lot of nonsense, full of those inaccuracies and absurdities charged to you.

I could go into further details on the proven value and performance of civilian overhaul and repair facilities in doing work for the Armed Forces but I think my point is made. If wrong, Mr. Goodwin has only to tell me where I can get one of those $25,000 jobs and he will have my most appreciative apology.

Norman A. Moonitz
Bayside, N.Y.

A True Observation

It was with much interest that I read your comments in Personal View (A/A Nov. 3, p. 7). I particularly noted your views that we are bickering about jet noise before the public has had a chance to speak its mind, and that "squeamish airport authorities" could cause "permanent damage to our national interests from the start." In my opinion, that is a very true observation, and one that has not been sufficiently taken into account.

Willis Player
Vice President
Public Relations
American Airlines

When & Where

NOVEMBER

Aviation Distributors and Manufacturers Assn., annual meeting, Statler Hilton Hotel, Dallas, Nov. 19-21.

International Air Transport Assn., public relations conference, Hamburg, Germany, Nov. 24-27.

Convertible Aircraft Congress, the Franklin Institute, Philadelphia, Nov. 28.

DECEMBER

American Rocket Society, annual meeting, Hotel Statler, New York City, Dec. 1-5.

Airline Electronics Engineering Committee meeting, Hotel Statler, Washington, D.C., Dec. 2-4.

Flight Engineers International Assn., anniversary banquet, New York City, Dec. 7.

The Aircraft Service Assn., annual meeting, Washington D.C., Dec. 16-17.

Institute of Aeronautical Sciences, Wright Brothers dinner, Washington D.C., Dec. 17.

JANUARY

International Symposium on Nuclear Fuel Elements, sponsored by Columbia University and Sylvania-Corning Nuclear Corp., Columbia University, New York City, Jan. 28-29.

For example, Rohr builds the complete, 40-foot fuselage section, jet pods and struts, sound suppressors and thrust reversers, and horizontal stabilizers for the great, new Boeing 707 Airliner, as shown above.

The fact that our record backlog figure is over 50% commercial contracts is just one of many reasons Rohr offers unusual security along with professional growth to highly-skilled aircraft engineers.*

Please forward resume to J. L. Hobel, Industrial Relations Manager, Rohr Aircraft Corporation, Chula Vista, California, Dept. 6-A.
* *Citizenship required.*

ROHR
AIRCRAFT CORPORATION

Chula Vista and Riverside, California

B.F.Goodrich

B. F. Goodrich Unilock Rivnuts® designed especially for aircraft and missiles

New lightweight steel Rivnuts with thread-locking feature preserve structural strength... save assembly time and costs

Ordinary anchor type fasteners used in aircraft and missiles require as many as three holes. And installation is made by two men who must have access to both sides of the work.

But new B. F. Goodrich Unilock Rivnuts can be installed by *one* man from *one* side of the work. Only one hole is needed. And the job can be done at any time during or after assembly.

This greater flexibility in manufacturing procedure means a substantial savings in cost. In addition, with only one hole required instead of three, greater structural strength is maintained.

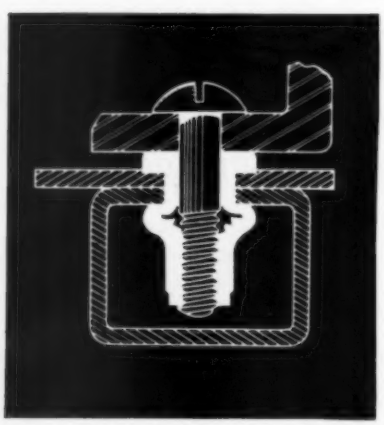
B.F.Goodrich Unilock Rivnuts, in fact, actually reinforce holes. That's because the equally spaced V-teeth under the Rivnut heads lock the Rivnuts to the material in which they are installed. This eliminates the need for a key and keyway — elements which ordinarily set up points of stress concentration.

The thread-locking feature is a short crimp in the shank of B. F. Goodrich Unilock Rivnuts. This provides attaching screws with an all-metal interference fit that locks them securely in place.

Made from aircraft quality alloy steel, B. F. Goodrich Unilock Rivnuts are actually lighter than most anchor type fasteners. Yet they will meet strength and torque requirements of Military specification MIL-N-25027 for lock-type nuts.

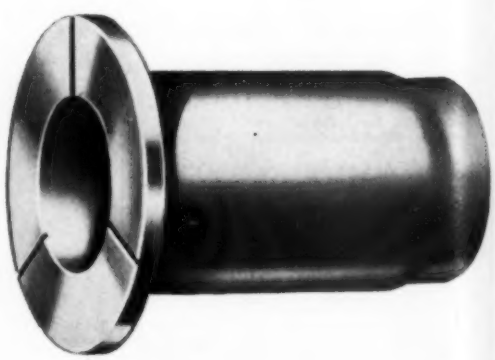
B. F. Goodrich engineers will be happy to make recommendations concerning the use of Unilock Rivnuts in your products. For complete information write *B. F. Goodrich Aviation Products, a division of The B.F.Goodrich Company, Akron, Ohio.*

B.F.Goodrich Unilock Rivnuts are basically the same in appearance and function as regular type Rivnuts. However, the Unilock design is identified by the V-teeth under the head and the crimped shank end which provides the thread-locking feature. Radial marks on top of the head readily indicate grip range.



Typical Unilock Rivnut installation in blind application. Installation principle is same as for regular Rivnuts.

Equally spaced V-teeth, made as an integral part of the under side of the head, engage with surface of material in which the Rivnut is installed, thus providing high torque resistance and eliminating need for keyed head and slot.



B.F.Goodrich ***aviation products***

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Labor Blasts Six-Carrier Strike Pact

Six U.S. airlines, in an unprecedented step toward a common front on labor issues, have agreed to help each other—financially—when any of them is grounded by "excessive" union demands. The carriers—American, Eastern, TWA, United, Pan American and Capital—immediately ran into violent opposition from the unions.

Entering the jet age and experiencing one of their most turbulent labor periods—with unsettled contracts on jet pilot pay, makeup of jet crews and pay scales for ground personnel—the six carriers came up with a pact that is unique in American industry.

The pact provides that struck airlines receive from the carriers still in operation amounts equal to their increased revenues attributable to the strike, minus direct expenses that apply. Payments will be made monthly, within 10 days after the close of the month, or more frequently if the parties agree. The first such payment by pact members was made to strike-bound Capital on November 8. The November 1 agreement (made retroactive to Oct. 20) was signed by Capital Airlines, then in the 16th day of a strike called by International Association of Machinists.

The document has been filed with the Civil Aeronautics Board, and other carriers were invited to join the six by submitting similar proposals. At presstime, no other lines had yet indicated their intentions one way or the other.

Labor branded the move as a "cartel" and there were hints of industry-wide strikes.

• **Conditions set forth**—One of three conditions must prevail before the one-year agreement comes into use: 1. A strike, shutting down flight operations, was called to enforce demands in excess of or opposed to recommendations of a Presidential emergency board; (2) there was a strike before employes had exhausted procedures of the Railway Labor Act; (3) a strike was called which is otherwise unlawful.

Although the pact went into effect immediately, the CAB has the power to disapprove it if it is found to be adverse to the public interest or in violation of the Civil Aeronautics Act.

In the event of disapproval, the agreement ends, and payments already made become debts owed by the struck carrier.

It was understood that an analysis of competitive route segments is involved in determining how much each of the other carriers' revenues has increased during a strike. Under this system, Pan American, which does not compete with Capital, does not pay in this particular strike. Capital's expenses during the shutdown reportedly were running about $50,000 a day.

• **Long time in discussion**—Although the agreement was triggered by the Capital strike, it had been preceded by discussions in the industry for months on the possibility of group bargaining with unions. And among proposals discussed was some type of strike insurance that would pay the "irreducible" expenses of a grounded airline. No industry agreement has been reached, but it seems likely that the six carriers drew on these discussions in drafting their pact.

On Sept. 15, a Presidential emergency board had issued recommendations in the dispute between IAM and Capital, Eastern, TWA, Northeast, Northwest and National. It recommended a two-year contract with both retroactive and future increases, and also expressed its views on working rules, fringe benefits, etc. The airlines accepted the board's findings, but IAM termed them "far from satisfactory."

On Oct. 17, IAM, sticking to its demand for increases substantially above those favored by the Presidential board, walked out at Capital. IAM strikes were threatened, then postponed, at Eastern and TWA while the union said it considered revised offers. Airline observers claimed the postponements were called because IAM wanted to use Capital as the "guinea pig."

This situation led the six airlines to assert in their agreement that they were faced with the "threat of extreme and unreasonable demands" made by IAM and that the union had "shown an utter disregard" for the emergency board's recommendations.

CAB was not expected to act on the agreement until it had considered the objections that undoubtedly would be filed by the unions.

• **Labor reaction**—Shortly after the six-carrier announcement, Clarence N. Sayen, president of the Air Line Pilots Association, said that if CAB approves the pact, the pilots "would have to start a war chest for a strike fund," and that such a strike could ground the nation's airlines. Another ALPA spokesman was quoted as stating that CAB, because of mail payments, would be put in the position of underwriting the exchange of strike revenue. IAM did not comment.

Most outspoken of the labor critics was George Petty, president of Flight Engineers International Association. Petty said the agreement was for the explicit purpose of union breaking, adding that "We will not stand by and see our unions and years of effort submerged in an airline profit pool."

"Presidential emergency board recommendations are in no way binding by law and are not meant to be so.

"We ask the CAB to mark this proposed combine for the illegal, immoral cartel which it is, and refuse to sanction it." he concluded.

Labor Gloom at a Glance

As airlines merged their efforts in a strike-aid pact to better balance the power at the bargaining table, major strike threats and "refusals to fly" jet equipment harassed the air transport industry on these fronts:

- Pan American enters its 22nd day of 707 Operations without a "line" pilot yet checked out on the new jet.
- Eastern Air Lines' pilots promise similar treatment of EAL's plan to introduce Lockheed Electra turboprops, are adamant in their refusal to fly until "third crew member" issue is resolved.
- Mechanic strikes threatening Northwest, TWA, and Eastern, were postponed as deadlines approached, but issues remain unsolved.
- Capital Airlines, hardest hit in the current wave of labor demands, neared the 30-day mark in a shutdown by striking mechanics that is costing it an estimated $350,000 a day.

Proprietary Rights

Contractors get protection under new rule revision

Contractors and subcontractors will be better able to protect their proprietary rights in privately developed manufacturing processes, and know-how as a result of the revision of Part 2, Section IX, of the Armed Services Procurement Regulation. New rules will be effective in 90 days.

Recognizing the bitter battle of Aircraft Industries Association, National Security Industrial Association, Strategic Industries Association, as well as other industry groups to protect contractor's "secrets", the Defense Department has restated its policy with respect to acquisition of data.

It said: "It is the policy of the Department of Defense to encourage inventiveness and to provide incentive therefor by honoring the 'proprietary data' resulting from private developments and hence to limit demands for data to that which is essential for Government purposes . . ."

Instruction calls for carefully limited requests for such data and, in the case of supply contracts, for specific negotiation. Data required would be included as a separate contract item.

West Germany Reveals Plan To Buy F-104 Starfighter

The Lockheed F-104 Starfighter will be bought by West Germany. This was finally decided when the Parliamentary Defense Committee unanimously approved an earlier recommendation of the Defense Ministry

Plans call for the purchase of 6 to 10 Starfighters from Lockheed in the United States. An additional 300 will be manufactured in West Germany under Lockheed license. Also to be purchased are the Fiat G-91 fighter bomber, and the Alouette helicopter.

The decision eliminates the Grumman F11-1F Super Tiger and the French Dassault Mirage 3. The German Starfighters will be powered by General Electric J79-7 engines.

Air Force Rewrites Security Rules on Combat Aircraft

Air Force has rewritten its security rules covering weapon systems, supporting systems and associated subsystems. Responsibility for classification rests with contracting commanders and project commanders. Rules are set out in AFR 205-49.

Generally, rules apply only to combat-type aircraft and missiles other than ballistic missiles and space projects. They do not apply to rotary wing, training, liaison, search and rescue, transport and glider-type aircraft. However, production schedules and numbers produced for inventory or accepted will be classified.

The Security Classification Chart of AF Aircraft follows:

Phases of Development and Production

1. Preliminary design studies and Phase I contracts through mockup.
2. Phase II contracts from mockup until factory roll-out of first experimental aircraft.
3. Phase III contracts from mockup until factory roll-out of first production aircraft. When the experimental and production aircraft are the same, or experimental and production aircraft are concurrent, then security classification for 2 will govern.
4. From factory roll-out of the first experimental aircraft until factory roll-out of first production aircraft. When 3 or 4 cover the same article or when 3 and 4 exist concurrently, the security classification for 3 will govern.
5. From factory roll-out of first production aircraft.

Items of Information	Phases of Development & Production 1	2	3	4	5
Manufacturing and model designation	U	U	U	U	U
Engineering design information	S	C	C	C	U
Physical characteristics including design gross weight	S	C	C	C	U
Performance in generalities	S	C	C	U	U
Exact performance and characteristic data	S	S	C	C	C
Photographs, drawings, models and mockup (including launchers) showing external configuration (See Block 12, DD Form 254 for additional information)	S	C	U	U	U
Internal photographs and drawings revealing significant capability and/or vulnerability (not to scale)	S	C	C	C	U
Significant aircraft capability and/or vulnerability pertaining to the following:					
Armament	S	S	C	C	C
Bombing	S	S	C	C	C
ECM	S	S	C	C	C
Reconnaissance	S	S	C	C	C
Significant wind tunnel data	S	S	C	C	C

S—SECRET C—CONFIDENTIAL U—UNCLASSIFIED

When model improvements or modifications require classification use appropriate phase of development and production.

Airline Financial Tempo Higher As Jets Spur More Merger Talks

By Selig Altschul

The financial pots of the airlines are sizzling on a line of burners.

In recent weeks, there has been a revival of interest in airline equities by investors and speculators alike. This was sparked by the belief that the airlines were a depressed group and "do for a turn." And it has been helped, in part, by slight gains in traffic and a modest improvement in earnings—although the latter in many instances have been camouflaged by accounting legerdemain ordered by the Civil Aeronautics Board.

The greatest boosh for airline shares, however, probably has been generated from the enthusiasm accompanying the introduction of jet transports into regular service by a number of airlines.

There is an old axiom in the marketplace that people buy equities, not on the facts as they actually exist, but on circumstances they imagine to prevail. The jet transport will, no doubt, transform many traveling habits and prove a great boon. Nevertheless it will be accompanied by many problems and expenses as a regular service pattern is established. The first year of the jets will definitely bring no great profits.

• **Mergers and interchanges**—Meanwhile, other factors are beginning to influence the airline financial picture. The major equipment interchange and leashing arrangement between Pan American and National has led to conjecture as to possible mergers.

Equipment interchanges, such as the PAA-NAL deal, have been used to good effect in the past. Aside from the competitive advantage of being first with jets in its markets, National stands to gain other major benefits from the proposed arrangement. Pan American, of course, will obtain corollary gains.

With jets entailing a capital outlay in excess of $5 million each, operating costs are substantial. No carrier can afford to have this equipment remain idle on the ground very long—depreciation charges go on regardless and bulk very large. For this reason, the PAA-NAL interchange facilitates a far greater utilization of the equipment.

But the significance extends beyond this point.

• Capital requirements of the two

U. S. NAVY selects CURTISS-WRIGHT

POWER AND DEPENDABILITY

for extended radar range on GRUMMAN WF-2 "Saucertops"

Providing airlift and mobility for giant saucer-like radomes that give new and longer range to carrier-borne radar, Grumman WF-2 "Tracers" are now in production for service on U. S. Navy Carriers. Like many other types of advanced Navy aircraft, these *early warning* "Tracers" rely on the tested and proved power of Curtiss-Wright engines.

On these same carriers, Curtiss-Wright Turbojet engines power over forty percent of the first line operational fighters and attack bombers. Around the world, Curtiss-Wright power in its many forms is performing round-the-clock duty with the military services of the U. S. and NATO nations.

WRIGHT AERONAUTICAL DIVISION

CURTISS-WRIGHT

CORPORATION • WOOD-RIDGE, N. J.

. . . Airline financial pots are sizzling

carriers can be importantly reduced.

• Broader schedules can be provided.

• And it can serve to reduce the capital outlay for equipment for both carriers while meeting their original schedule demands.

No doubt this arrangement figured prominently in NAL's cutback of its orders for three DC-8s and six Pratt & Whitney J57s, reducing its new equipment costs from $75.3 million to $59 million.

• **Big plans, varied abilities**—At last count, planned capital expenditures for new aircraft and support equipment for U.S. carriers aggregated almost $3 billion compared with a 1957 year-end net worth of about $753 million. Their total assets amounted to more than $1.676 million.

But the abilities of the separate airlines to obtain needed capital vary widely. And the search for funds continues unabated and is continuously being influenced by varying factors. Even planned capital commitments are not inviolate and are subject to revision.

For example, the internal self-generation of cash may vary widely from projected schedules in current and future periods. Airline success in contesting CAB rulings on spare parts accounting represents some $50 million of equipment that can be returned from current assets to property accounts where it can be depreciated.

An even more significant change is coupled in the carriers' legal challenge of CAB's ruling on depreciation, requiring use of a seven-year life on new four-engine aircraft, capitalization of the cost of first overhaul and a raise in the residual value of equipment from 10 to 15%.

Its effect can be seen in that Eastern, through this enforced adjustment, would add about $9 million after taxes to 1958 net income. Under former policy, about $18 million would be self-generated and available in cash.

Obviously, the upholding by the U.S. Supreme Court of the pro-airline Appeals Court decision will have a far-reaching effect on internal self-generation of cash and reported earnings, possibly for 1958 and certainly for 1959 and beyond.

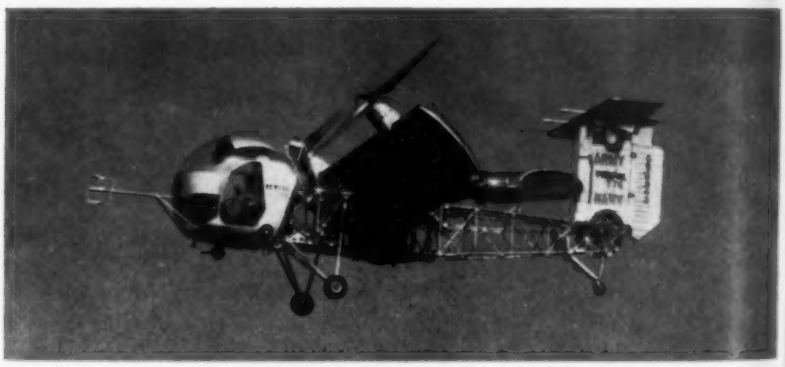
The high cost of jets may, in time, lead to a series of mergers thus mitigating a measure of capital needs. Relatively smaller trunks may well be precluded from profitably utilizing the expensive and high-capacity jets. Unless some relief is found, a compelling force for mergers may well be set in motion.

It is known that informal or exploratory talks as to a few possible combinations already have taken place. But even if voluntary merger were proposed, they would be headed for tough sledding. The problems of pricing a franchise, reaching top-level accord, sanctions of boards of directors and stockholders are not simple to hurdle.

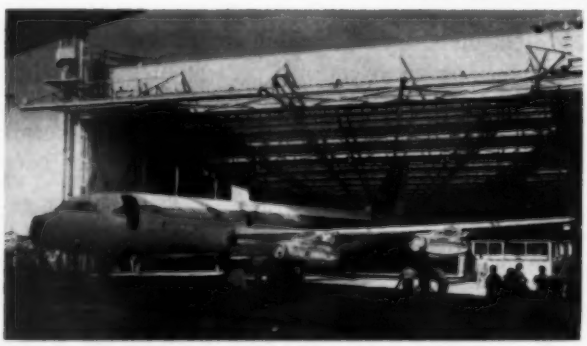
Probably the biggest obstacle remains in obtaining CAB approval. And assuming mergers are effected toward a stronger air transport network, there is always the threat that CAB may produce a new series of uneconomic route duplications.

AIR NEWS IN PICTURES

Vertol Tilt-Wing

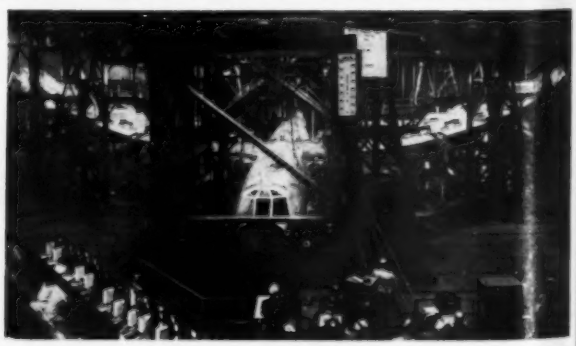


VTOL, in first tilt-wing version, can rise straight up, rotate its wing to proceed like a conventional airplane, and return to land vertically. In the air, the ship can go from top speed to a sudden stop and reverse the process made by Vertol Aircraft Corp., it is being considered by both Army and Navy. Vertol designation is Model 76; Army designation is VZ-2.



880 Rolls to Final Assembly

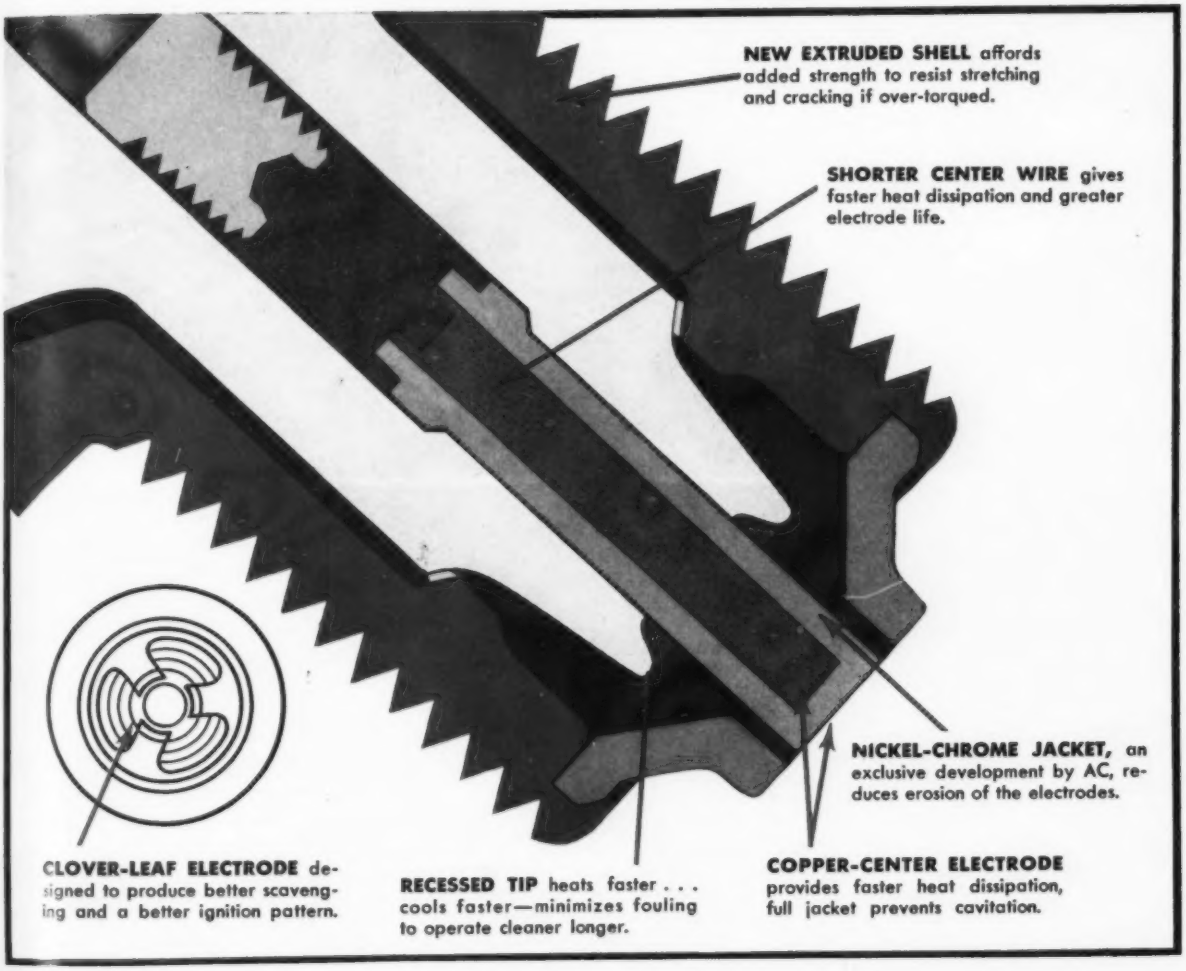
Convair 880 has been rolled to final assembly. Nearly complete externally, the General Electric CJ-805 engines and main tail structure have been installed. Next assemblies will be the horizontal tail assembly, fuselage doors, and parts of the wing leading and trailing edges. Ship is scheduled for final roll-out in December and will fly early next year. 78 orders for 880s and 600s are in.



B-52G in Static Tests

"Torture testing" of the B-52G nears the halfway mark at Boeing Wichita. Objective of the testing is to discover the amount of strain each part of the big bomber is able to withstand under every condition of flight. Wings have been deflected upward 24 feet from the jig position and down nine feet with serious strain. At the end of the program, wings will be deflected upward until they actually break.

HERE'S BIG NEWS ABOUT THE "BUSINESS END" OF A SPARK PLUG


NEW EXTRUDED SHELL affords added strength to resist stretching and cracking if over-torqued.
SHORTER CENTER WIRE gives faster heat dissipation and greater electrode life.
NICKEL-CHROME JACKET, an exclusive development by AC, reduces erosion of the electrodes.
CLOVER-LEAF ELECTRODE designed to produce better scavenging and a better ignition pattern.
RECESSED TIP heats faster . . . cools faster—minimizes fouling to operate cleaner longer.
COPPER-CENTER ELECTRODE provides faster heat dissipation, full jacket prevents cavitation.

NEW AC-275-D AIRCRAFT SPARK PLUG FOR THE "HOT SPOT" IN P&W 2800 ENGINES

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When AC designs a product for a particular application—BIG THINGS RESULT! As illustrated above, the new AC-275-D is six ways better!

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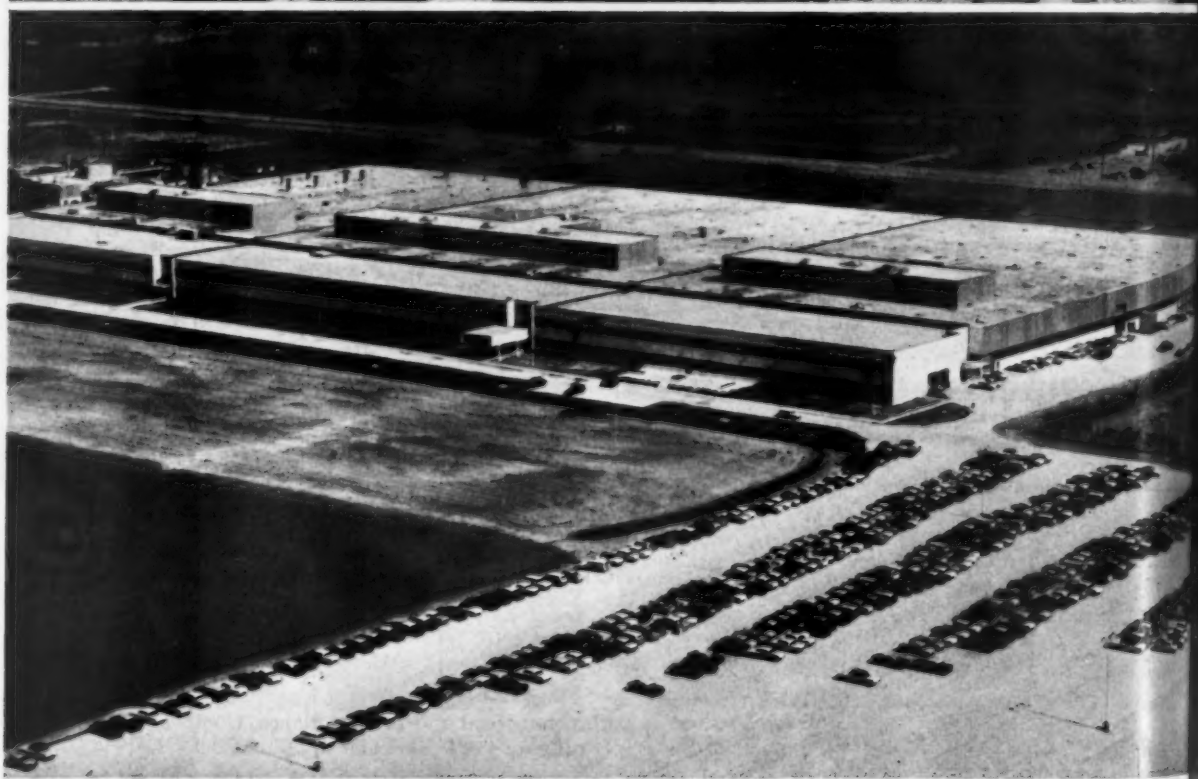


WILLGOOS TURBINE-ENGINE TEST FACILITY—(top picture). Here tomorrow's power plants are "flown" under conditions of simulated altitude, speed, and temperature often impossible to attain in actual flight. It is the most complete privately-owned turbine-engine test facility in the world.

FLORIDA RESEARCH AND DEVELOPMENT CENTER, a completely air-conditioned plant with 17 acres under roof, is specially equipped for development of new propulsion systems of almost any type. This facility supplements Pratt & Whitney Aircraft's research and development installations in Connecticut.

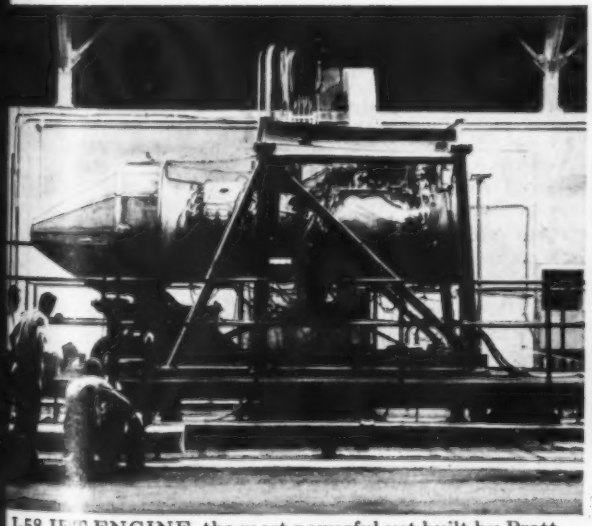
PROVING A PAIR OF THOROUGHBRED JETS

Whether the 30,000-pound thrust class J-58 . . . or the small, highly efficient JT12, aviation people know these newest power plants by Pratt & Whitney Aircraft are thoroughbreds.

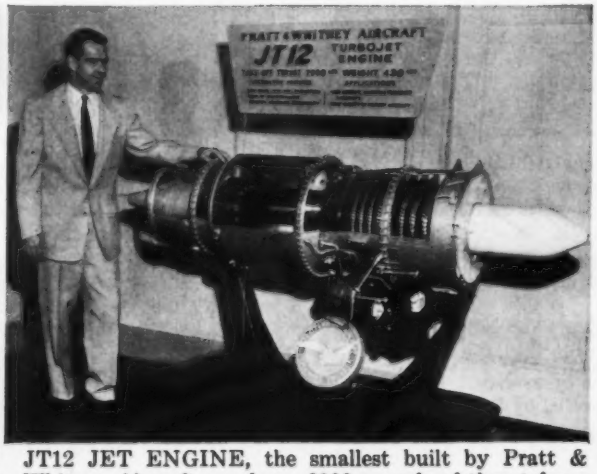
Aviation people know, as well, that these new members of the "first family" of aircraft engines will be thoroughly proved in performance before ever taking to the air.

Beginning with matured design, and backed by unequalled experience, Pratt & Whitney engines are tested and re-tested, developed and refined in facilities second to none. Principal among them are the Willgoos Turbine-Engine Test Facility, heart of Pratt & Whitney's complex of research and development installations in Connecticut, and the new Florida Research and Development Center. The Florida center is specially equipped to develop and test advanced propulsion systems, and here the J-58 first roared into life.

Born thoroughbreds, Pratt & Whitney Aircraft's new J-58 and JT12 engines before long will take their place as dependable power plants for new generations of American aircraft.



J-58 JET ENGINE, the most powerful yet built by Pratt & Whitney Aircraft, is shown on a test stand in Florida. It is designed for operation at very high Mach numbers.



JT12 JET ENGINE, the smallest built by Pratt & Whitney Aircraft, produces 2900 pounds of thrust for a total weight of only 430 lbs. With a single spool and fixed geometry, the JT12 promises outstanding performance, reliability and ease of maintenance for many possible applications.

Pratt & Whitney Aircraft

Division of United Aircraft Corporation, East Hartford, Connecticut

CONNECTICUT OPERATIONS—East Hartford, North Haven, Southington, Meriden, Middletown
FLORIDA RESEARCH AND DEVELOPMENT CENTER, United, Florida

. . . News Briefs

• **Skyhawk contract awarded**—Navy has awarded Douglas-El Segundo a $79 million contract for production of A4D-2N, a new version of A4D Skyhawk.

New model, to be powered by one Curtiss-Wright J65, is slated for delivery starting in 1959.

• **Ayer buys Continental DC-6Bs**—Frederick B. Ayer & Associates, New York, has contracted to buy two DC-6Bs from Continental Air Lines, will refit them for round-the-world used transport sales tour—one as a 66-place model selling for $775,000 and the other a 102-passenger version at $875,000. CAL will deliver aircraft within next nine months.

• **Braniff contracts for overhaul**—Braniff Airways will contract with Allison to overhaul the Model 501 engines for its turboprop Electra and with Southwest Airmotive for the Pratt & Whitney J75s on its Boeing 707-220s. Carrier eventually will phase into turbine overhaul as it phases out of piston engine work.

• **Signs of the times**—Boeing Airplane Co., which four years ago had virtually a 100% military backlog, reports some $857 million in outstanding orders for 182 jet transports. This represented 34% of its $2.5 billion backlog as of Sept. 30.

• **Light system test**—USAF has begun four to six week flight testing of new all-weather runway approach light system at Dow AFB, Me. Installation includes "narrow-gauge" flush lighting and centerline approach light systems.

• **No. 2 DC-8 flight postponed**—Douglas has again set back the first flight date of its No. 2 DC-8, the first to be powered by Pratt & Whitney JT4 (J75) engines. It also will have experimental wing leading edge flaps. First DC-8 to have Rolls-Royce Conways will be the No. 9 airplane.

• **Cessna-Aircraft Radio merger**—Boards of directors of Cessna Aircraft Co., Wichita, Kan. and Aircraft Radio Corp., Boonton, N.J. have authorized their respective officers to plan merger of the two companies subject to stockholders approval. Basic agreement would provide each ARC shareholder with two Cessna shares for each three ARC shares with exchange to be made after December 15 payment by Cessna of 10% stock dividend to stockholders on record November 19.

DEFENSE ANGLES

By Betty Oswald

Beggars' Night at the Pentagon is about two months long. The period of darkness started in mid-October when DOD and Budget Bureau experts got down to the serious business of trying to pare Army, Navy and Air Force requests for new money. Objective is a balanced budget in fiscal 1961. Best guess is a target which may boost 1960 spending in fiscal 1960 about $1 to $1.5 billion. FY 1959 spending will hit $40.8 billion. Strength of the fiscal experts is buttressed by President Eisenhower's demand for economy.

But what projects are to be dropped? What to be included in the program due at the printer's before the year end? Everybody, who is anybody, is walking around the E-ring of the Pentagon with his program book, neatly divided into what can be termed "musts" and what might be described as "like to haves."

Navy wants a second nuclear-powered aircraft carrier and the aircraft to go with it. AF wants a new early warning aircraft with a high priority and the money to push the aircraft nuclear propulsion program to prototype stage. Army wants airlift, and relief from the 5,000-pound limit on surveillance aircraft among other things.

And a major problem this year is that reserves have been cut back in some areas to what has been described as a "danger point." However, the big question is still whether the services want the new equipment badly enough to give up something else or whether their requirements fall into what might be termed the "all this and heaven too" category.

Negotiations are at about midpoint. Service chiefs, the civilian secretaries and their aids are trying to prove the essentiality of projects tentatively slated for the wastebasket or for delay on the ground that state of the art doesn't warrant the expenditure or the equipment is not needed now.

Basically though the budget exercise won't stem the brewing storm over the philosophy of defense and the storm is certain to be aggravated as a result of the Congressional elections. Big war or little war? How much is enough? Should the defense program be tailored to meet an overriding need to balance the budget or should defense needs stand by themselves?

• **Reorganization is in the air**—What it means, and what form it will take isn't clear—and won't be for many months. Of immediate concern is the fate of Army, Navy and Air Force research organizations, now that National Aeronautics and Space Administration is in business, and Defense Secretary Neil H. McElroy has plans to continue the Advanced Research Projects Agency and the Office of Guided Missiles.

Best guess is that the fog will continue, at least until Mr. McElroy finds a new director of research engineering to take the place of Dr. Paul Foote, Assistant Research Secretary, resigned. In the meantime, both Air Force and Navy have projects under way for reform of their research organization. The Air Staff is still studying the report of the Stever Committee, which suggested a long series of basic reforms in AF research management. Navy has a committee headed by Under Secretary W. G. Franke which is looking at ways and means of making Navy's research programs "more responsive" to the needs of the Chief of Naval Operations.

• **AMC decentralization** — AMC continues the process of decentralization of buying activities in an effort to improve management. Top staff will ultimately devote all of its time to supervision and management, leaving operating functions to the Air Materiel Areas and to the new Aeronautical Systems Division. P.S. Industry likes it because the AMAs don't have their feet imbedded in concrete and are more willing to listen to new ways of doing jobs.

• **Suggestion of the week**—Here's an easy formula for unification. Give the Army to the Marine Corps and the Air Force to the Bureau of Aeronautics. Everyone would end up wearing one uniform and the aim of one Army, Navy and Air Force would be achieved.

BENDIX* IGNITION SYSTEMS—FOR THE BEST IN JETS

General Electric's J79 jet engine—an engine capable of powering aircraft at twice the speed of sound—incorporates an ignition system designed and manufactured by Scintilla Division, of Bendix Aviation Corporation. Years of ignition design experience have made Scintilla Division a primary source for reliable ignition systems used in the newest and finest military aircraft.

The J79 is General Electric's answer to the need for a high-thrust, low-weight, jet engine for today's and tomorrow's high performance aircraft. Due to its outstanding thrust-to-weight ratio, this engine has a wide range of applications, including guided missiles, bombers, fighters and commercial aircraft. In addition to its high performance capabilities, the J79 features installation flexibility, maintenance simplicity and uses a minimum of critical material.

Serviceability, reliability and extended overhaul life are inherent features of Bendix-designed jet engine ignition systems.

Canadian Affiliate: Aviation Electric Ltd., 200 Laurentien Blvd., Montreal 9, Quebec.
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Latest military helicopter achieves new standards of performance; carries Bristol's extensive experience of power transmission into twin-rotor field.

The Bristol 192 introduces significant advances in twin-rotor flight. Extremely efficient performance; completely reliable on one engine only; a markedly satisfactory power/weight ratio.

It offers a high degree of serviceability. For Bristol's long experience of helicopters, particularly in the vital areas of power transmission and rotor-head design, h been embodied in the 192, to give reliability and ease maintenance beyond that of any competitor.

Answers stringent safety and load requirements

Ordered for the RAF, the 192 has been designed to m military requirements, including the ability to lift troops, or 6,000 lb distributed freight.

Its two Napier Gazelle 1,300 shp "free turbine" engi interconnected to keep rotor-phasing true and for sing engine safety, deliver sea-level power up to 6,000 ft,

OL 192

safety and serviceability

sign, h rovide ample power reserves for emergencies. In fact, d ease ith one engine driving both rotors, the 192 climbs at ore than 1,200 ft/min, and can make a safe, fully ontrolled landing.

l to m The 192 cruises at 120 knots; has a maximum range of 00 miles. It hovers at 8,000 ft, without ground effect, o lift eaching service ceiling at no less than 13,250 ft.

engi Full production of the 192 began from the drawing-or sing oard, a policy made practicable by Bystol's unequalled 0 ft, xperience—gained through the experimental 173 and the ycamore.

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Crash Hypos Instrument R & D

Airspeed, altitude, rate of climb, attitude indicators termed "not enough" to warn pilot plane is "sinking"

By George Hart
Technical Editor

Inadequacy of existing flight instruments for current high-performance high-gross weight transports is a problem which reared its ugly head some time ago, and little corrective action has been taken to overcome it.

But the recent crash of an Air Force KC-135 jet tanker transport at Westover AFB has resulted in a flurry of behind-the-scenes actions among aircraft and instrument manufacturers. This already has led to establishment of instrument development programs—on a very-high-priority basis.

The reason: Experts reluctantly have concluded it's possible for an aircraft to be flown into the ground without the pilot being informed that this is happening.

It is understood that, after the KC-135 crash, troubled engineers in various companies cast their minds back to such crashes as that of a Northeast Airlines DC-6 at Rikers Island after takeoff from La Guardia. Also, one where a TWA Constellation crashed into a bog after takeoff from Shannon, Eire. The circumstances surrounding these crashes were similar:

- Large, transport-type aircraft were involved.
- Flying conditions were considered unusual in that the crashes occurred on dark nights, in very marginal weather with minimum visibility and ceiling.
- In each case, flaps were set to decrease ground roll, with the result that each aircraft followed a shallow climbout flight path.
- In each case, the pilot in command was highly experienced.

Now, it has been concluded that:

- **In each case, until ground impact, instruments in the cockpit were indicating normal flight conditions for climbout after takeoff.**

After takeoff, flaps are raised and power is reduced. In a jet using water injection for takeoff, cutting off water injection means cutting back power. These actions cause a momentary reduction in rate of climb. Sometimes, the aircraft sinks. When a flat climb has been set up, the aircraft could settle back into the ground.

- **Instruments at fault**—Present-day flight instruments just won't react in the split second it takes for this to happen, these engineers say. Change in airspeed could be insufficient to alert the pilot as to what is happening. Tolerance and lag in today's altimeter and rate of climb indicator is such that, under these circumstances, they might as well not be there at all. Attitude gyro error due to acceleration is more pronounced in large aircraft where acceleration is spread over a longer period. It seems the error is a function of time rather than acceleration force.

One would think the sinking of the aircraft would be sensed, but this is not necessarily so. The captain of the airliner involved in the Rikers Island crash, a 15,000-hr. pilot, emphasized during the investigation that no settling of the aircraft was felt by him or other surviving crew members and passengers.

- **What is the answer?**—Those involved feel that what is needed is a highly accurate indicator that will tell the pilot whether or not he is following a safe, climbing flight path after takeoff. This instrument would combine V_2 speed with aircraft attitude to give an indication of flight condition. The ideal would be a monitor located on the glare shield.

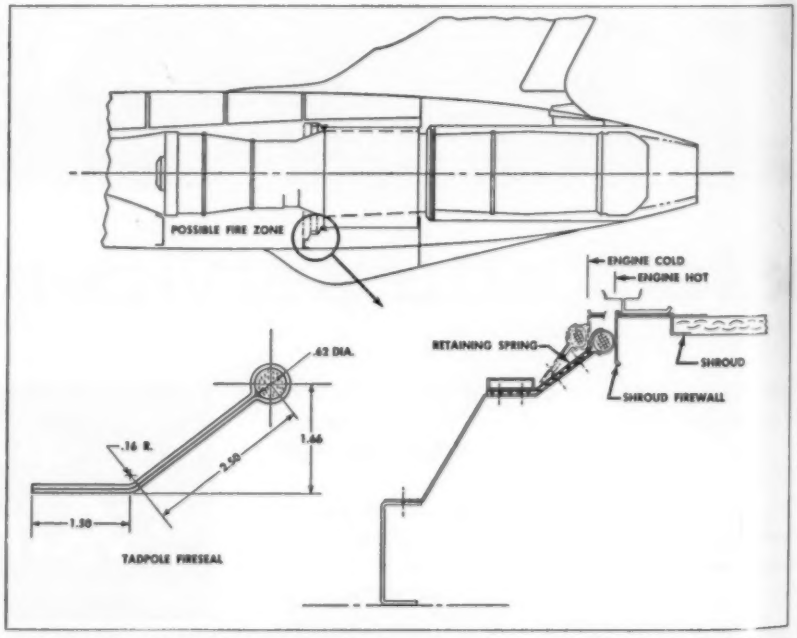
The reason for introducing attitude is that tests with fighter-type aircraft have shown that the high-powered jet actually can be looped if V_2 speed alone is monitored after takeoff. This could hardly happen to the big jet transports, but it would be necessary for the pilot to reduce power. The big thing is that he would not reduce power or lift sufficiently to fall below this required flight path.

Tadpole: Fighter Firebreak

If a jet pilot in a Republic F-105 fighter-bomber should suddenly discover flames from the engine's "hot" rear section beating against the firewall and threatening his cockpit, he'd have to make some really important split-second decisions.

Johns-Manville Corp. has developed a fire-wall seal that provides more time for decisions.

Called the Tadpole, the seal has, until recently, been under security wraps. It has been used in F-84F and RF-84F jets, both 650-mph or better aircraft. More recently a more sophisticated version has been performing the



MORE SOPHISTICATED TADPOLE firewall seal is used with Pratt & Whitney J75/F-105 combination.

ESSO

WING TIPS

WHEELS DOWN ON GO AROUN'. When you miss an approach and take a wave-off, it's good technique to leave the wheels down on the go around. Thus you avoid the chance of forgetting to lower them again before landing.

GAS CHECK. Keep an old jar, or even an empty tin can, handy when checking your fuel supply prior to take-off. Drain-off at least a cupful of fuel and examine it for color, water, and dirt which might forecast trouble.

CLO[SE] FLIGHT PLAN. Upon arrival at destination, be sure to close your flight plan with the CAA. If this isn't done, your plane will be reported missing and a search will begin. Result: embarrassment for you, a possible fine, and great expense for the government.

REM[EM]BER: For "Happy Flying"... look for the famous ESSO Sign for the most dependable aviation products.

ESSO DEALER AIRPORTS. After each landing, see to it that your plane gets a thorough service checkup. How? By choosing an airport that has an Esso Aviation Dealer. There are over 600 from Maine to Texas . . . where you get the finest in aviation service (and the finest in Esso Aviation fuels and lubricants, too).

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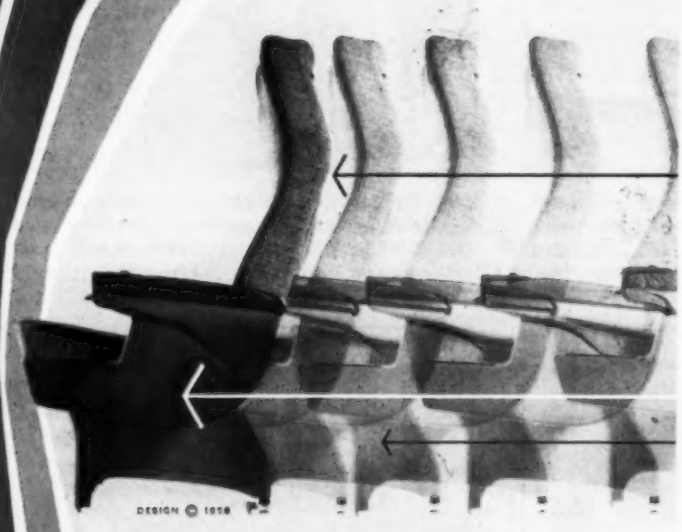
TECO pulls the "Stop" on high G's!



TECO's really reliable, tested, aircraft seat energy absorption unit is available—ready to make light of instantaneous high-G deceleration forces!

For technical data, or to borrow TECO film, write: TECO, Inc., 3210 Winona Avenue, Burbank, California

TECO
Aircraft Seats
Burbank, California

TADPOLE seal is installed at flange separating "cool" accessory-and-compressor section of jet engine from "hot" combustion-tailpipe section.

same protective functions in the F-105. The seal in the F-105, better able to withstand chemicals present in the newer fuels and hydraulic fluids, weighs only 4½ lbs.

If a leak occurs in the hydraulic or fuel lines, the Tadpole prevents these fluids from seeping rearward and becoming ignited by contact with the hot metal in the combustion area. It also retards spread of fire when leakage is ignited from another source.

Tadpole Firewall Seal No. MX4381, designed for jets with operating temperatures above 600°F, has a core of knitted Inconel mesh with a foil cover. Outside cover is asbestos cloth, with a reinforcing Inconel wire insertion and an aluminum finish.

Even if the seal is subjected to extremely high temperatures for a long time, there remains a network of Inconel wires around a foil-enclosed mesh core which still act as a firewall seal.

Lighting Ruckus

CAB move to standardize exterior lighting is hit by manufacturers, carriers

Efforts by Civil Aeronautics Board to legislate a standard for aircraft exterior lighting were shelved this month as the chore of evaluating existing lights and systems was passed to the Airways Modernization Board.

This, in short, was the outcome of a two-day meeting held November 3-4 by CAB with civil and military lighting experts to resolve a growing controversy on the subject.

The technical dispute got under way several months ago when United Air

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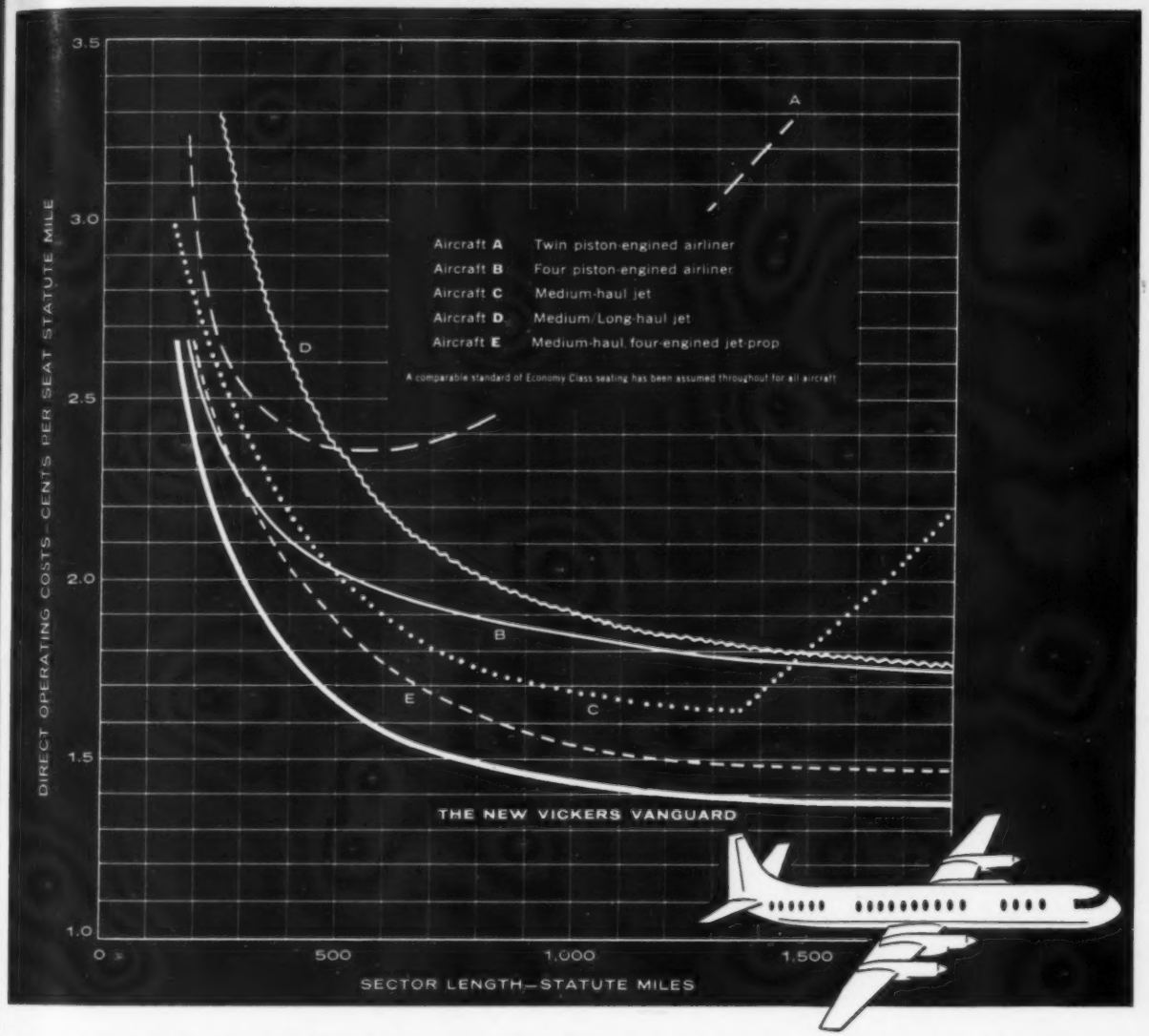


AIRLINE REPORTS LOWEST SEAT-MILE COSTS

A recent impartial evaluation by one of the world's leading airlines showed that the new jet-prop Vanguard will offer the lowest seat-mile operating costs on all sectors from 200 miles to 2,000 miles. The Vanguard, with a maximum payload of 29,000 lb. and a 139-seat configuration, was compared to five other modern airliners for economy class jet age service—including British and American pure jets and jet-props.

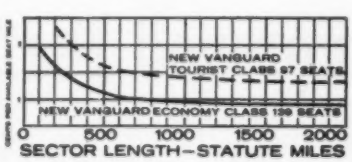
HIGHEST PROFIT POTENTIAL

To most American carriers in the jet age, the Vanguard will offer a profit potential *at least 35%* higher than that of any comparable airliner—and *twice* that advantage on economy configurations. Many factors contribute to Vanguard profitability on all ranges up to 2600 miles. Rolls-Royce jet-props have proved their reliability and ease of maintenance. Simultaneous on-and-off loading of both passengers and freight permits fast turnaround. On high-density routes, the Vanguard is the biggest profit-earner ever offered to the airline industry.

The Vanguard's large, well-balanced passenger/freight capacity makes possible high utilization and high profits even on off-peak services. Because of its smooth, silent comfort and speeds that will be competitive with jets on short-to-medium ranges, the Vanguard offers strong passenger appeal that makes for good load factors.

For detailed specifications and a cost analysis based on your operations, contact Christopher Clarkson, U.S. representative, 10 Rockefeller Plaza, New York 20, New York.

The chart at the right shows the Vanguard's direct operating costs, and is based on A. T. A. costing methods. The figures are representative for American carriers. Note that Vanguard costs will be about 2¢ per available seat mile on 100-mile sectors—and *under* 1¢ on all sectors over 900 miles.



NEWEST FROM THE WORLD LEADER IN JET-PROP AIRCRAFT...

VICKERS VANGUARD

POWERED BY FOUR ROLLS-ROYCE TYNE ENGINES

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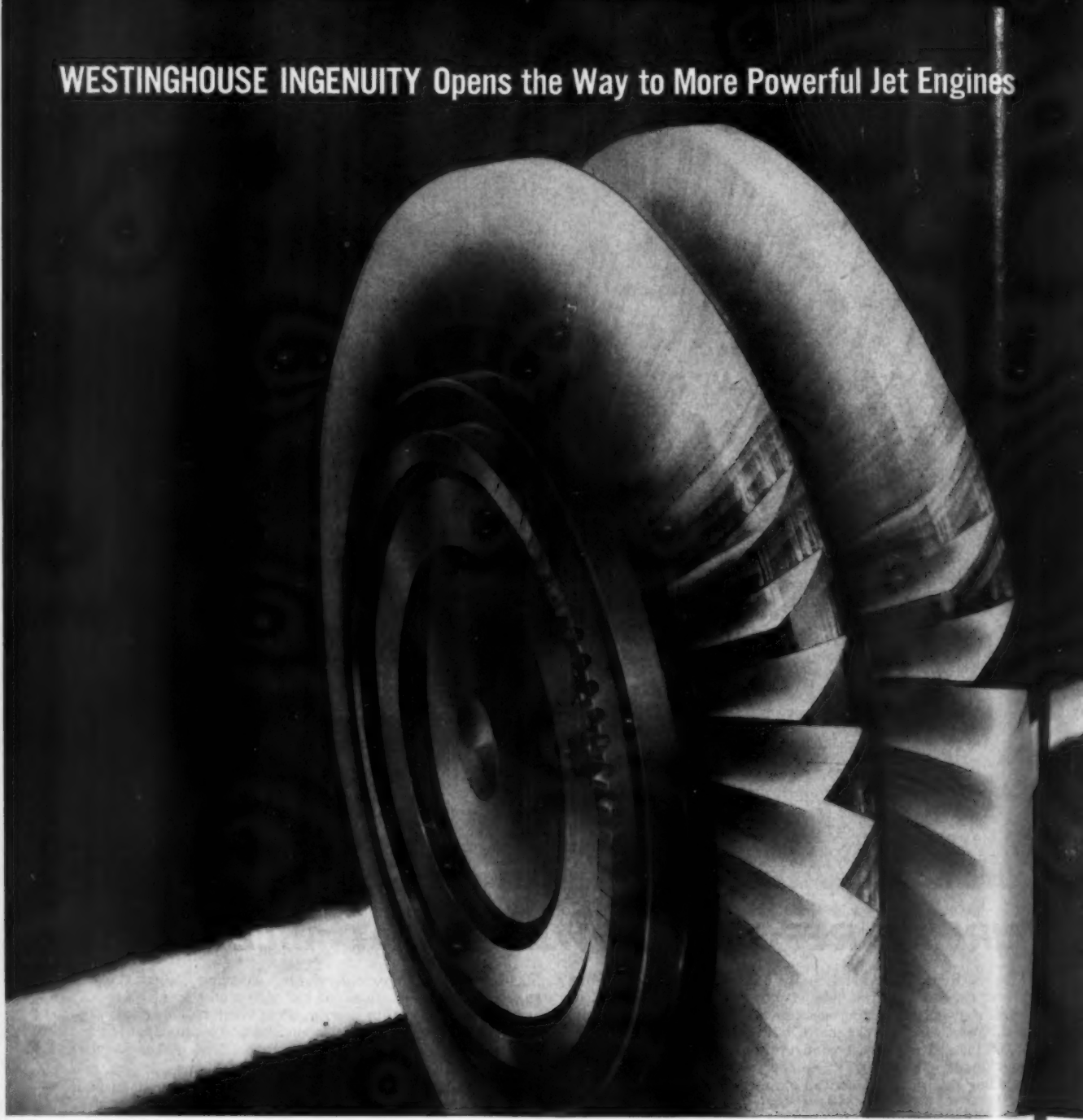
WESTINGHOUSE INGENUITY Opens the Way to More Powerful Jet Engines



Improved Performance Through New High Temperature Alloys

Fabricated molybdenum and Nicrotung, two of the latest Westinghouse metal miracle developments, are outstanding examples of metallurgical progress toward higher operating temperatures and more efficient airborne propulsion systems.

Inconel-clad molybdenum can be used in air-breathing engines without deterioration from high-temperature oxidation. "Clad-moly" parts have proved successful in extensive engine testing at temperatures above 2000°F.

Nicrotung is a new turbine blade alloy invented by Westinghouse through the use of "predesign"

techniques. A nickel-chromium-tungsten alloy, Nitrotung has the best high-temperature strength of known super-alloys and may be cast readily into intricate shapes.

These are two examples of Westinghouse leadership in metallurgy for improved airborne propulsion system performance.

Take advantage of this ability to design, test and produce outstanding products for all phases of jet propulsion. Contact your Westinghouse sales engineer or write the Westinghouse Aviation Gas Turbine Division, P. O. Box 288, Kansas City, Missouri.

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ENGINEERS!

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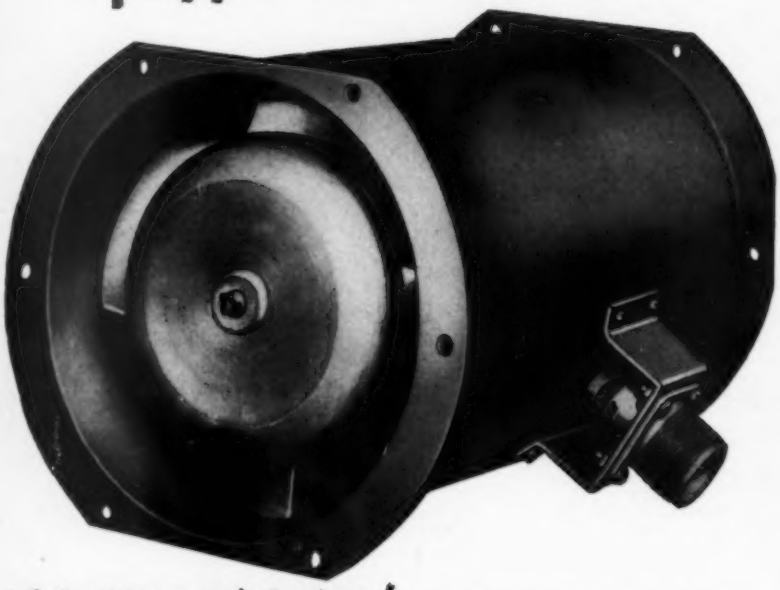

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IT IS LIGHT . . . fans weigh from 10 ounces to 50 pounds . . . made of magnesium and aluminum alloys.

IT IS COMPACT . . . three major parts make up simple design . . . mounts *inside* the duct . . . as part of the duct. No frills.

IT IS EFFICIENT . . . careful design exceeds Army-Navy specs . . . efficiency ratings up to 86% . . . pressures as high as 70" WG.

IT IS "STANDARD" . . . 250 models and 1300 designs ready. Ratings from 20 CFM to 6000 CFM.

IT IS USED BY THESE COMPANIES . . . Boeing, Douglas, Fairchild, GE, Grumman, Hallicrafters, Lear, Lockheed, Martin, Motorola, North American, RCA, Raytheon, Sylvania, Vertol, Western Electric, Westinghouse.

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ENGINEERING

Lines, with Air Transport Association backing, asked CAB sanction of a new exterior lighting system of its own design for use on DC-8 jets.

The Board's Safety Bureau, seeking industry comment, issued CAR Draft Release 58-15 proposing rule changes that would legalize the UAL light.

Reaction was spontaneous. With the ink hardly dry, lighting manufacturers clamored against what they considered a threat of extinction to their individual lighting systems. They lost no time campaigning for industry support.

As a result, by the CAB deadline for comment on the rule proposal, the complexion of the situation had changed entirely. ATA had withdrawn its support, United Air Lines was noncommittal, and other parties—ranging from the USAF and Navy to helicopter manufacturers—all had their own conflicting ideas on the best system to be used.

During the CAB session, it was quickly agreed by all on hand that a standard exterior lighting system is needed; but there was little agreement on what the standard should be.

The basic features of a system and the method of evaluating it were also in question. FAA spokesmen outlined three desirable characteristics of any system:

- **It should make maximum use of present day equipment.**
- **It should offer minimum ambiguity as to intelligence it relates.**
- **It should be of minimum possible cost.**

As to further testing, they added that present experimental systems should be eliminated from general flying, and all flight testing of new lights should be conducted at FAA flight test centers.

These latter two points were opposed by light manufacturers now anxious to market as many of their units in as many places as possible.

FAA will conduct a program of further evaluation and make recommendations in approximately six months. In the meantime, the present regulations will remain in force without change.

More study will be conducted on daylight systems, but the result will, by unanimous agreement, be compatible with the nighttime system.

Experimental flight testing will be monitored by FAA, though more such systems will probably be allowed to roam the airways.

Some method of retrofit for any change also will be devised in the near future, a matter of particular concern to private aircraft operators and the military.

THE MAN BEHIND THE GREASEGUN . . . The exploits of the fliers and aircraft that are keeping our nation secure can not be written without proper credit to the unheralded man behind the greasegun. He is a member of a maintenance crew . . . a crew chief . . . a plane captain who is content to enjoy the reflected glory of his ship. Something of him flies with every aircraft, and when ship and crew return safely he knows his job has been well done. For he knows that nothing could fly, no pilot could climb aboard without his contribution. Kaman Aircraft recognizes the job these men are doing and gives them a tangible salute by designing helicopters which require minimum maintenance and make the man behind the greasegun whistle while he works.

PIONEERS IN TURBINE POWERED HELICOPTERS

THE **KAMAN** AIRCRAFT CORPORATION • BLOOMFIELD, CONNECTICUT

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Now flying, the ELECTRA is available for "off-the-shelf" procurement by the military services.

introducing the new

ELECTRA PROP-JET TRAINER

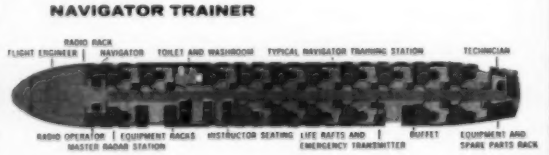
America's first commercial prop-jet transport, the all-new Lockheed Electra, is now in production for leading world airlines.

Lockheed surveys of USAF training requirements formed the basis for Lockheed designs proposed for 2 trainer versions of the Electra. The advanced Electra navigator trainer and the electronic countermeasures trainer are both ideal for these highly specialized missions. Each combines new concepts of individualized student instruction, safety, performance flexibility and operational economy never before achieved in *one* airplane for Air Force training programs.

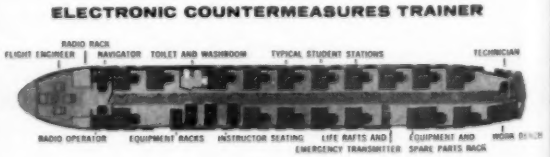
LOCKHEED *means leadership*

Lockheed Aircraft Corporation
CALIFORNIA DIVISION
Burbank, California

NAVIGATOR TRAINER



ELECTRONIC COUNTERMEASURES TRAINER



Navigation Instrument

Designed for use with all present self-contained aircraft navigation systems, new navigational heading-bearing, distance indicator has been developed by Weston Instrument. Transistorized unit operates on 28v and, according to the company can replace individual indicators.

Circle No. 1 on Reader Service Card.

Crack Detector & Sorting Instrument

Designed and built by Magnaflux Corp., new eddy current instrument consisting of an indicating unit, inspection probe and power line cord, locates defects in conductive materials. Designated Magnatest ED-500, unit measures 8″ x 11″ x 15½″ and operates on 110v, 60-cycle, 1-phase ac.

Circle No. 2 on Reader Service Card.

. . . Product Briefs

• **Quick-release pins**—Developed by Aerofast, new line of detent pins are available in a wide range of sizes, materials, finishes and styles.

Circle No. 3 on Reader Service Card.

• **Wire and cable jacket**—Introduced by the Zippertubing Co., product is said to withstand 2,000°F continuous operating temperatures and 3,000°F for brief periods. Manufactured of aluminized reflective asbestos fiber, jacket is closed by a plastic or metal zipper track stitched to the fiber. Available in I.D's from 3/8″ up in increments of 1/8″.

Circle No. 4 on Reader Service Card.

• **Drum dispenser**—Developed by Coolant Equipment Corp., Model 76S dispenses filtered water methanol solutions and hydraulic fluids to turbojet aircraft directly from a drum by means of 2½ gpm reciprocating hand pump. Stainless steel filter unit insures maximum cleanliness. Unit can be supplied with wheels and tow bars.

Circle No. 5 on Reader Service Card.

• **Airframe bearing greasers**—Monarch Aircraft Sales, Inc. has developed a line of bearing pullers and greasers for K3A through K6A, K3 through K6, K53 through K56 and KL3 bearings. In addition, tools can be obtained in any special size.

Circle No. 6 on Reader Service Card.

• **Aircraft windshield coating**—Complete windshield assemblies for DC-3s, Lodestars and PV-1s which prevent icing or fogging, have been developed by the Sierracin Corp. Transparent electrically conductive coating is sandwiched between tempered laminated glass using standard 28v system.

Circle No. 7 on Reader Service Card.

• **Digital flow indicator**—Developed by Performance Measurements Co., Model DFI-2 presents digital data directly in units of flow (gpm or lbs./hr.). With either three or four number wheels, basic indicator accuracy is said to be ±0.10% full scale. Input to the unit is from any turbine type flow-meter with a maximum frequency of 500 pulses per second for full flow.

Circle No. 8 on Reader Service Card.

• **Ground elevator indicator**—Introduced by Jarico and Associates, clear plastic device with raised yellow numerals is said to cover the glass of any standard altimeter, adhering by means of capillary attraction. To operate, the "0" on the indicator is set at field elevation, thereby giving actual altitude above ground.

Circle No. 9 on Reader Service Card.

• **Fuel filter element**—A micropleat-type filter replacement element for main fuel-line filters on such aircraft as DC-4s, 6s and 7s has been developed by Bendix Filter Division, Bendix Aviation Corp. Element measures 3½″ x 6 1/8″ and has a rated pressure differential ranging from approximately 0.01 psi at 2-gpm flow to 0.8 psi at a 10-gpm rate of flow.

Circle No. 10 on Reader Service Card.

• **Rotary inverter**—Designed by Varo Mfg. Co., Inc., inverter operates from standard 28v dc input and delivers 750 va with voltage controlled to ±0.2% and frequency to ±0.01%. A bimetalic tuning fork controls the 400-cycle output to better than ±0.01% over a temperature range of –550° to 71°C. Model 4617 measures 12 5/16″ x 6″ x 10¼″ and weighs 38 lbs.

Circle No. 11 on Reader Service Card.

• **Relay adjustment tools**—Developed especially for adjusting relays, kit of tools by P. K. Neuses, Inc. includes nine special wrenches of various types, box-type wrenches, spring tensions gauge and replaceable blade contact burnisher. Eighteen tools are included.

Circle No. 12 on Reader Service Card.

• **Digital barometer**—Developed by Dynametrics Corp., Model PT-103 barometer is a fixed calibration instrument adjusted for local gravity conditions. Measuring 44″ x 18″ x 14″, digital unit gives five-place accuracy. Remote indication or recording of pressure can be conveniently arranged.

Circle No. 13 on Reader Service Card.

• **Oxygen mask**—Aro Equipment of California has designed a passenger oxygen mask designated Aro No. C-7040, for use in commercial jet transports. Mask is made of high-impact plastic, and face piece is molded of soft polymerized plastic material. A one-liter reservoir oxygen bag is incorporated in the mask with an inhalation check valve.

Circle No. 14 on Reader Service Card.

ROLLS-ROYCE DEVELOPMENTS

1,000 HOUR INITIAL OVERHAUL LIFE FOR AVON RA.29

The Air Registration Board of Great Britain has approved an initial life of 1,000 hours between overhauls for the Avon RA.29 turbo jet of 10,500 lb. thrust. This follows extensive engine proving flights in de Havilland Comet 2E aircraft, during which engines were examined after lives of 250, 500, 750 and 1,000 hours.

—another technical advance in

ROLLS-ROYCE
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AERO ENGINES • MOTOR CARS • DIESEL AND GASOLINE ENGINES • ROCKET MOTORS • NUCLEAR PROPULSION

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—LITERATURE—

• **Servo valves**—Catalog contains a series of curves and schematics which highlight the design and performance characteristics of low-flow servo valves. Included is a detailed glossary of servo valve terms as well as a detailed cutaway photo of typical valve in this series. Moog Valve Co., Inc.

Circle No. 76 on Reader Service Card.

• **Instrumentation tape recorder**—4-page bulletin describes characteristics, specifications and operating features of model C-100 series. Engineering specifications of the transistorized recording system are included. Mincom Div. of Minnesota Mining & Mfg. Co.

Circle No. 77 on Reader Service Card.

• **Mobile air conditioner**—8-page illustrated brochure describes model H-35 mobile unit designed for airline use. With a 35-ton refrigeration capacity, truck mounted unit is said to be capable of cooling both piston and turbine powered transports. C. G. Hokanson Co., Inc.

Circle No. 78 on Reader Service Card.

• **Sealants and molding compounds**—Technical chart describes polyurethane, thiokol and silicone-based electronic sealants and molding compounds which have excellent electrical properties, high-temperature, fuel and cold flow resistance. Coast Pro-Seal & Mfg. Co.

Circle No. 79 on Reader Service Card.

• **Small alloy tubing**—Data book discusses drawing, annealing, finishing and testing of small alloy tubing. Types, properties and applications of various metals used for tubing are included. Precision Tube Co.

Circle No. 80 on Reader Service Card.

• **Automatic rudder control**—8-page brochure describes engineering details, installation specifications and flight applications of the Super Arcon. Brochure explains how "graveyard spins" may be prevented; describes components of the system and their approximate location in aircraft. Lear, Inc.

Circle No. 81 on Reader Service Card.

• **Transistors**—168-page manual contains a complete listing of all registered U.S. transistors. It describes basic semiconductor theory and various transistor construction methods used by the industry. General Electric Co.

Circle No. 82 on Reader Service Card.

• **Electronics**—452-page catalog lists more than 32,000 items for industrial maintenance, research and production requirements. Sample of contents includes all types of tubes and transistors, test instruments and equipment, two-way radio-telephones, timers, batteries and generators etc. Allied Radio Corp.

Circle No. 83 on Reader Service Card.

NEW ATC L-BAND TRANSPONDER TEST SET

The newest instrument to come from the Kearfott Co., Inc. Microwave Division is this unique L-BAND TRANSPONDER TEST SET. The new unit performs all the testing features required to check out L-BAND airborne transponders manufactured to ARINC characteristics 532B and ANDB (AMB) 2.3 NAIB. As a completely self-contained unit, it eliminates the need for multi-instrument test set-ups and allows easy portability.

SPECIAL FEATURES

1. Completely self-contained
2. Double Pulse Generator (with provision for third pulse)
3. Strip-transmission line directional couplers
4. Signal generator
5. Calibrated strip-transmission line attenuators
6. Power monitor
7. Pulse spacing network
8. Portable and lightweight
9. Adaptable to ramp test set

SPECIFICATIONS

1. Frequency range: 950-1220 mc/sec.
2. Double pulse generator with independent amplitude control. Repetition rates from 15-2,000.
3. High Q wavemeter, 950-1220 mc/sec.
4. Direct reading attenuators.
5. Pulse spacing direct reading, 1-30 microseconds.
6. Power monitor; meter reading average of peak power.
7. Portable, lightweight aluminum chassis and carrying case with handles.
8. Weight—59 lbs.
9. Dimensions: 21″ wide x 12″ high x 18″ deep.
10. Standard relay racking.
11. Finish grey enamel.
12. Power requirements: 115 volts AC, 50-440 cycles per sec.—150 watts.

Kearfott — General Precision Equipment Corporation GPE

KEARFOTT COMPANY, INC.
A Subsidiary of General Precision Equipment Corporation
Microwave Division
14844 Oxnard Street
Van Nuys, California

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Palo Alto, California

Circle No. 112 on Reader Service Card.

Checklist of Fuel Contamination Sources

Relatively speaking, rust-contaminated aviation fuel in a reciprocating engine is not critical; in a jet engine, it can be fatal. Reciprocating engines will burn fuel containing rust particles; a jet engine would be stopped on the same fuel. The reason: the fine filters and close tolerance parts in the jet engine increase the danger of clogging and blocking of fuel flow and the formation of deposits on critical controls.

One of the major sources of fuel contamination is in the hydrant and pipeline systems. Another is in base tankage. Based on past experiences in trouble shooting at various bases which have experienced contaminated-fuel problems, the Air Force's *Aircraft Accident and Maintenance Review* offers the following checklist:

1. Insure that adequate fill and discharge nozzles are installed in storage tanks. This is to prevent undue agitation of the tank bottoms or to pull the residue from tank bottoms.

2. Provide baffle plates or flow diversion in tanks where there is a possibility of pulling solids from tank bottoms.

3. Flush lines periodically where fuel moves very slowly and allows sediment to collect in the lines (i.e. engine test lines).

4. Clean jet fuel storage tanks before the accumulation of sludge gets too deep. The type of service such as pipeline, tanker flow characteristics, etc., has much to do with the time factors for cleaning.

5. Be certain that any filters which do not indicate some pressure drop after a reasonable time and amount of service are pulled for inspection and perhaps replacement of the elements.

6. Instruct operator personnel to allow a settling period of at least 24 hours after each tank filling.

7. Check the accuracy of pressure gauges on all water separators and micronic filters.

8. Exercise care in installing micronic filter elements. Inspect all seals, gaskets, media and the assembly to be certain no fuel may pass the filter without going through the elements.

9. Replace the excelsior packs of water separators with the new, approved conversion units if warranted.

10. Instruct operators to cap all fuel hose or pipe connections when not in use, especially in areas subject to dust storms.

11. Sweep up rust accumulations on the top of floating roof tanks to prevent the rust from being carried down into the tanks. This is rust that flakes off from the inside of the shell.

12. Provide an adequate fuel inhibition program for all pipeline operations.

13. Run scrapers through long pipelines annually.

14. See that water separators are installed on incoming base fuel lines when a pipeline supply system is used. Most rust and scale can be removed from fuel before it enters the system.

15. Do not use water slugs to separate products in a pipeline unless it is impossible to maintain adequate velocity to keep the products separated. This would be an emergency measure that would be used only if it is imperative to make a fuel shipment.

16. Check the pressure drop on all separators and filters regularly during fuel movements.

17. Do not install filter elements that have become brittle or fragile because of long storage. Always install new fresh elements.

Miami Melee

Storm over concessions may wreck port authority

The Dade County (Fla.) Port Authority has run into rough weather which threatens to catapult it from its independent status. The storm broke over charges of alleged questionable practices in the granting of concessions at Miami International Airport, culminating in a grand jury investigation.

Castigating the port authority for its laxity and unbusinesslike conduct, the Dade County Grand Jury recommended, among other reforms, that all contracts for lease of facilities at the airport henceforth be awarded on a sealed-bid rather than negotiated contract basis and that the port authority be placed under the jurisdiction of the county manager as a new department.

Membership of the port authority, which also sits as the Dade County Commission, was recently increased from five to eleven members, with the election of six new commissioners. Two of the new commissioners reportedly favor the move and are currently considering ordinances which would abolish the port authority as a separate entity. Strong opposition, however, has come from the aviation industry in Miami. It contends any such action would be a serious mistake, and would seriously delay and impede important decisions affecting the whole aviation industry. The Greater Miami Aviation Association, whose membership represents all phases of aviation, is expected to take a formal stand on the matter at an early meeting.

Rome, Paris, London to Use New York Anti-Noise System

The pattern established by the Port of New York Authority for commercial jet operations at Idlewild Airport has been adopted, for the most part, by its European counterparts in Paris, Rome and London.

All require use of a preferential runway system for landings and takeoffs under normal conditions and a climb to 1,500 feet immediately after takeoff to minimize noise over outlying residential areas. All, too, with the exception of the Paris Airport Authority, have set rules limiting commercial jet operations to daylight hours.

Final rules adopted by the Paris authority for use of LeBourget Airport have been relaxed in two respects. There are no restrictions on hours of use, nor are there any specific requirements regarding takeoff procedures. According to Pan American Airways, it is tacitly understood, however, that the procedures used will be those resulting in minimum noise over built-up areas. Procedures used are a matter of agreement between the individual airline and the airport authorities.

. . . Airport Briefs

• **Longer runway at Brussels**—The Belgian Ministry of Transport has approved construction of an 11,500-foot runway at Brussels' Melsbroek Airport, capable of taking the largest jet aircraft. To be made of concrete, the runway is scheduled to be ready before the winter of 1959.

• **TSO-N6b under fire**—Air Transport Association has taken exception to the Civil Aeronautics Administration's Technical Standard Order-N6b, insofar as the maximum runway lengths established for federal aid participation would presume to place limitations on future aircraft design. Similar objections were voiced to TSO-N6a.

• **Northeast files suit against Dade county**—Northeast Airlines has brought suit against the Dade County (Fla.) Airport Authority, charging discrimination in landing fees at Miami International, from January, 1957 through June, 1958. Northeast paid $120,910 in landing fees and taxes vs $17,682 which, it said, would have been billed Eastern and National for the same number of flights and passengers.

PETROLEUM HELICOPTERS, INC. AND ALOUETTE

Petroleum Helicopters, Inc., New Orleans, La., largest U. S. helicopter operator, has successfully placed jet-powered Alouettes in regular service with its rotary-wing fleet. ➢➢ With the Alouette, Petroleum Helicopters is maintaining its reputation as a leader — providing faster, more efficient, and up-to-date equipment for its customers.*

Some outstanding — yet routine — P.H.I.-Alouette operations are:

- *One Alouette flew 130 hours in 30 days covering 10,400 nautical miles.*
- *Landings and takeoffs at rigs were made in winds exceeding 35 knots.*
- *On one mission, 700 lbs. of cargo were carried 71 miles in 53 minutes (9 hours by surface craft).*
- *Saved the life of an injured oil worker — picking him up 70 miles offshore and bringing him to a hospital — when time meant life!*

**Designed by Sud Aviation*

The Alouette is assembled, tested and distributed by:

REPUBLIC AVIATION CORPORATION

HELICOPTER DIVISION

FARMINGDALE, LONG ISLAND, N. Y.

Circle No. 113 on Reader Service Card.

Temco

AIRCRAFT
DALLAS

Making major breakthroughs in brazing stainless sandwich

Two radically new process developments by Temco Engineering may well revolutionize the entire concept of fabricating stainless steel honeycomb structures. One is "Temcombing," Temco's *continuous process* of stainless sandwich fabrication. The other is a simplified "Two-Phase" method for brazing stainless honeycomb structures. Patents now are being applied for on both of these processes.

Conventional, time-consuming batch brazing methods seem primitive compared with Temcombing. Panels of virtually unlimited size now are feasible in place of small, batch-made panels, thus reducing weight and critical tolerance errors. After lay-up, finished Temcomb panels can be turned out at rates up to 18 inches per minute, and at considerably *lower costs than by batch methods.*

Temco's exclusive Two-Phase resistance brazing method eliminates the need for furnace operations. For complex shapes, the Two-Phase process is the fastest and most advanced developed to date.

Advanced weapons systems, probing beyond Mach 3, demand whole new domains of materials and reliability. Temco engineering capabilities are meeting these demands with new developments and fabrication techniques in stainless steel, titanium, and other high-temperature materials. Pioneering in design, tooling and production for tomorrow's spacecraft industry is part of Temco's complete systems capabilities — all ready to meet *your* challenge.

TEMCO
AIRCRAFT CORPORATION · DALLAS, TEXAS

TOMORROW'S NEED IS TODAY'S CHALLENGE AT..

Channel Wing's Second Chance

By Clifford Allum
Business Flying Editor

New financial blood has been injected into the Custer Channel Wing Corp. of Hagerstown, Md. as a result of an association between Willard R. Custer, inventor of the aircraft and president of the company, and Joseph W. Frazer, founder and former president of the Kaiser-Frazer Corp.

A new company known as the Custer-Frazer Corp. has been formed with headquarters in New York City, to handle the licensing and sales of the CCW-5, a twin-engine, five-place STOL aircraft.

Production aircraft will be manufactured by a newly formed Canadian company—Custer Channel Wing (Canada) Ltd. of Montreal—in association with Noorduyn Norseman Aircraft, Ltd., Leader Products Ltd. and Gorde Tool and Die Co.

The New York firm has placed an initial order for the first 100 aircraft and two-thirds of all production thereafter. The remaining third will be made available to the Canadian company which has exclusive sales rights to the Canadian market. President of this company is W. G. Spence.

In addition to setting up nationwide distributorships, Custer-Frazer is negotiating to license the channel-wing principle for use by other aircraft companies.

A radical departure from the conventional business aircraft, the CCW-5 combines the speed and comfort of a standard-high performance aircraft with STOL flexibility and near-hovering ability. This is accomplished by using the propeller to draw air to the channel wings instead of pulling the wings to the air.

The first two production aircraft will be assigned to the CAA for certification tests. However, Custer anticipates little difficulty in securing a type certificate—the current prototype has already accumulated more than 100 hours of test flying with the full cooperation of the CAA.

——CCW-5 Specifications——

Powerplants	(2) 240-hp Continental IO-470-M
Fuel Capacity	200 gal.
Dimensions	
Wing span	41 ft. 2 in.
Length	28 ft. 8½ in.
Height	10 ft. 10 in.
Cabin Width	4 ft. 5 in.
Cabin height (internal)	4 ft. 5 in.
Weights	
Empty	2,900 lbs.
Gross (normal)	5,400 lbs.
Gross (max. allowable)	6,000 lbs.
Performance	
Max. speed	200 mph
Cruise speed	180 mph
Landing speed	15 mph
Rate of climb	3,000 fpm
Range	1,680 mi.
Takeoff and Landing distance	100 ft.
Price	$55,000

. . . Business Flying Briefs

• **Improved Cessna 172**—Cessna Aircraft Co. has introduced an improved version of its all-metal four-place 172 for 1959. Changes include the addition of fairings on the landing gear, new gear-toothed brakes, nylon tubeless tires, a redesigned engine cowl and revised instrument panel. Offered for the first time as optional equipment is the Wright "Executive" radio with 60 channels. Price of the new model is $9,250 f.a.f. Wichita.

• **Low-priced Piper**—Piper Aircraft Corp. is studying the market potential for a two-place sport, business and training airplane. A target price of under $5,000 has been set; preliminary design study is in process. New aircraft will be known as the Papoose and will be a low-wing side-by-side airplane with a tricycle landing gear and powered with either a 90- or a 100-hp engine.

• **New aircraft**—Davis Aircraft Corp., Lake Village, Ind. is planning to set up manufacturing facilities for the production of a new all-metal, 4-5 place business aircraft designated Model DA-1. To date, the prototype has accumulated more than 80 hours flying time and application for a type certificate has been made. Aircraft is powered with a 180-hp Lycoming 0-360-A1A which gives a cruise speed of 125 mph. Other specifications are: Fuel capacity—42 gals.; weight, empty—1,200 lbs., gross —2,400 lbs. Dimensions: wing span—32 ft.; length—22 ft. 3 in. The DA-1 has a statically balanced all-moving Vee-tail which is interchangeable.

ALL-CHANNEL VHF COMMUNICATIONS

WITH REVOLUTIONARY ALL-NEW TRANSISTORIZED POWER SUPPLY

- 90-360 channel transmitter (50 kc spacing; 118-135.95 mc)
- 90-560 channel receiver (108-135.95 mc)
- Permits crystal-controlled tuning to VOR/LOC frequencies and simultaneous glide slope channeling.
- Permits SCS, DCS or completely flexible cross channel tuning.
- New transistorized power supply saves space and 4 pounds weight.
- CAA TSO'd for scheduled airline use.
- 22 pounds total weight, ½ ATR.

Send for new descriptive brochure.

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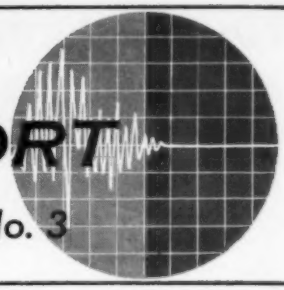
NATIONAL AERONAUTICAL CORP.
Fort Washington, Pa.

Circle No. 114 on Reader Service Card.

Vibration and Shock

ENGINEERING REPORT

A Case History of Environmental Control...No. 3



PROBLEM

TO PROTECT VERTICAL GYROSCOPE in jet fighter radar fire-control systems from shock and vibration of combat maneuvers, gunfire recoil, and rough landings.

SOLUTION

ENGINEERED MOUNTING SYSTEM

MODEL 1995 safeguards vital aircraft performance and equipment reliability.

Robinson MET-L-FLEX resilient cushions of specially fabricated stainless steel wire provide a greater damping factor—actually 5 times that of rubber. Lasting performance of the all-metal mounting system is assured regardless of exposure to oil, dirt, moisture, ozone, and temperature extremes.

MODEL 1995
MOUNTING SYSTEM

SPECIAL FEATURES:

Angled resilient elements add to equipment stability, reduce space requirements, and contribute to excellent rotational stability characteristics.

PERFORMANCE:

With a vibratory input acceleration of 10 G, Model 1995 provides 94% isolation efficiency in the 200-350 c.p.s. frequency range allowing only .6 G to reach the equipment. Vertical and horizontal natural frequency is 13.7 and 8.6 c.p.s. respectively. Due to high damping, peak acceleration force to which equipment is subjected is limited to 1.4 G at mounting system resonance.

Rotational displacement of gyro, a critical factor affecting performance, is controlled to a fraction of a degree even during resonant conditions.

RESULT:

More dependable operation of the radar fire control system, hence greater operational reliability of the aircraft through application of a Robinson shock and vibration control mounting system.

By applying Robinson's concept of controlled environment in the design of MET-L-FLEX suspension systems, more than thirty-seven different gyro mountings have been successfully developed and produced in quantity.

ROBINSON CONTROL IS RELIABILITY CONTROL

ROBINSON AVIATION INC.
TETERBORO · NEW JERSEY

West Coast Engineering Office: Santa Monica, Calif.

Circle No. 115 on Reader Service Card.

Milt Arnold to Head General Aircraft and Leasing Co.

Milton W. Arnold, who resigns as vice president-operations and engineering of Air Transport Assn. effective Nov. 30, has become president of General Aircraft and Leasing Co. with headquarters in Washington, D.C.

Although details of the new organization were still being formulated at presstime, it was learned that the firm is a Delaware corporation and Henry M. Marx, legal counsel of 29 Broadway, N. Y., is a director and executive.

First order of business for GALC under Arnold's leadership will be the sale or lease of 25 Douglas DC-7s purchased from American Airlines. All 25 aircraft will be delivered by June 30, 1959.

CAL Names H. L. Lawrence As Executive Vice President

Harding L. Lawrence has been named executive vice president of Continental Air Lines, succeeding Clarence C. West, Jr., who is retiring.

West, well known and highly regarded in airline circles, has been with CAL since 1939 in sales, traffic and executive management. He has been a director for many years. Prior to joining CAL, he was with United Air Lines.

Lawrence, 38, was vice president-traffic and sales of Pioneer Air Lines, which merged with CAL in 1955. He held a similar post with CAL and was later promoted to vice president-executive-administration and elected a director.

Two New Division Heads at Goodyear Aircraft

John B. Reiker (left) is new division manager in charge of Goodyear Aircraft Corp.'s lighter-than-air program. He is responsible for solicitation and contact administration. William L. Leek has been named head of Goodyear's newly created metal products department, and is responsible for metalcraft structures, Bondolite, ground support equipment, capsules and related special products.

People on the move in . . .

. . . Transport

D. P. Renda, vice president-legal for Western Air Lines, has been elected corporate secretary to succeed the late Paul E. Sullivan. Renda will continue to head the legal division of Western.

George G. Foster, formerly Alaska Airlines district traffic and sales manager in Fairbanks, has been named manager of tour programs. New post will require him to divide his time between Fairbanks and the company's offices in Seattle.

William S. Johnston, formerly of Bruce Payne & Associates, New York management consultants, will fill the post of manager, cargo marketing analysis, for American Airlines. **R. R. Huber** will serve as American's new market promotion specialist.

Captain William J. Scott, formerly operations manager for Irish air transport companies, assumes the new post of assistant general manager (technical). **James Gorman,** secretary-transatlantic services, is advanced to assistant general manager and continues as secretary. **Patrick J. Brennan,** former commercial manager, has been promoted to assistant general manager (commercial). **Michael J. Dargan,** who has been staff and service manager, becomes assistant general manager (administration). **Jeremiah F. Dempsey** remains general manager of Irish Air Lines.

. . . Manufacturing/Military

Vertol Aircraft Corp. has announced the election of three vice presidents: **James N. Davis,** director-government operations, becomes vice president-government operations; **Hamilton W. Lord** was elected financial vice president in addition to his duties as treasurer; **Virgil J. Wiltse,** director of industrial relations division, becomes vice president-industrial relations.

Max Golden, who has been serving as deputy assistant secretary of the Air Force (Materiel), has been named general counsel for the Department of the Air Force, replacing **John A. Johnson,** who has been appointed general counsel for the National Aeronautics and Space Agency.

Robert W. Morris has been appointed manager of The Garrett Corp.'s foreign operations department; **Pierre DuFay** has been named European engineering representative. **Bertram N. Snow** has announced his resignation as director of the corporation.

Donald R. Spotz, vice president and general sales manager of Pesco Products Division, Borg-Warner Corp., has been named president and general manager of the division.

Captain Martin W. Mason (USN, ret.), formerly technical assistant to the commanding officer of the Navy Aviation Supply Office, Philadelphia, has joined the Allison Division of General Motors as manager, liaison-Navy.

Robert T. Stringer has been appointed an assistant sales manager for The Firewel Co.'s Aeronautical Division.

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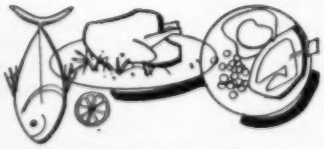

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INTERNATIONAL REPORT—

By Anthony Vandyk

How's the German aircraft industry doing with its various license production programs? Not too well, according to latest figures. Less than half a dozen Nord Noratlas Packet-like transports have so far been produced by the three manufacturers cooperating on this program—Hamburger Flugzeugbau, Siebelwerke and Weser. A total of 112 Noratlases are scheduled to be built. The situation with the two smaller foreign types being built under license in Germany is only a little better. Heinkel and Messerschmitt have completed about 30 of the 210 Fouga Magister jet trainers on order while Focke-Wulf has built about the same number of Piaggio P.-149D piston-engine trainers. The Focke-Wulf program calls for the production of 190 P.149Ds. Best performer in the German aircraft industry is Dornier but here a locally-designed aircraft is involved —the Do27 reconnaissance plane.

• **Fokker delivers to Aer Lingus**—November 19 will be a proud day for Fokker for this is when the Dutch company will deliver its first two production F-27 Friendships—to Aer Lingus. The Irish airline will put them on the Dublin-Paris route before the end of the year. Scheduled flying time will be about ten minutes less than that of the Viscount which the F-27 replaces on this run. The third production F-27 will go to Braathens SAFE, the Norwegian independent. Fokker is particularly happy about getting its first military order for the F-27. The Dutch Air Force has bought 12, and 10 will be delivered in the Freightship version with an enlarged freight door and stronger floor.

• **F-104 dashes Dassault hopes**—French hopes that the aircraft industries of France and Germany were working toward integration were dashed by the German Defense Ministry's decision to re-equip the Luftwaffe with the Lockheed F-104 rather than the Dassault Mirage 3A. The French thought that the Mirage 3A would be chosen on political grounds even though performance-wise (except for take-off and landing runs) the Dassault plane is outmatched by the F-104A. Perhaps one reason why the Germans lost interest in the French interceptor was the French government's insistence that it should be sold as a package to the Germans—with French radar and French missiles. The Luftwaffe had made no secret of its desire to have the fighter of its choice equipped with Sidewinder missiles and American radar.

• **Capacity controversy**—The Italian government and Italy's flag airline seem to be out of step on the question of capacity. The government wants British and Italian capacity on Italy-U.K. routes to be the same. The Italian airline, on the other hand, does not seem to desire to put on the capacity. The reason may well lie in the fact that British European Airlines is a powerful force on the Alitalia board even though it is only a minority stockholder. This may be why Alitalia offers such small capacity on the Italy-U.K. routes as compared with its British competitors (BEA and BOAC). Perhaps it also explains why the utilization of Alitalia's Viscount fleet is reported to be so much lower than that of other operators. The capacity issue deadlocked the Italian-U.K. bilateral talks for a long period. The only way a new bilateral could be signed was by referring the issue to a special committee. The new bilateral, incidentally, gives Alitalia a long sought after concession—the authorization for the Italian airline to route some of its services to the U.S. via London.

• **Airport service charge spreads**—That much-resented "bite"—the "airport service charge" levied on departing passengers — is spreading over Europe. Latest country rumored to be planning to exact this charge is Switzerland. The present roster of European nations who demand money from the departing passenger is: Denmark, France, Italy, Norway, Portugal, Sweden and the United Kingdom. The sum varies from 50 cents to several dollars.

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FLY THE FINEST... FLY **TWA** TRANS WORLD AIRLINES

Summary of U.S. Airline Revenues and Expenses For Second Quarter 1958 vs. Second Quarter 1957

Compiled by American Aviation Publications from Official CAB Data

Airlines	Total Operating Revenues			Passenger Revenues			Total Operating Expenses			Net Operating Income		
	1958	1957	% Change	1958	1957	% Change	1958	1957	% Change	1958	1957	% Change
DOMESTIC												
American	81,286,871	79,848,397	1.8	72,569,776	71,578,035	1.4	72,124,557	70,689,146	2.0	9,162,314	9,159,251	0.03
Braniff	15,164,436	13,819,441	9.7	13,896,705	12,794,224	8.6	13,772,656	12,600,194	9.3	1,391,780	1,219,247	14.2
Capital	26,663,038	24,899,858	7.1	25,053,084	23,591,895	6.2	25,615,801	23,202,675	10.4	1,047,237	1,697,183	—38.3
Continental	6,524,442	5,591,726	16.7	5,990,675	5,167,258	15.9	6,635,908	5,447,728	21.8	—111,466	143,998	.....
Delta	21,989,562	19,941,566	10.3	19,922,431	18,325,809	8.7	20,727,766	17,732,887	16.9	1,261,796	2,208,679	—42.9
Eastern	63,262,060	62,889,700	0.6	59,339,790	58,998,419	0.6	57,233,514	60,215,255	—5.0	6,028,546	2,674,445	125.4
National	13,778,930	13,345,946	3.2	12,311,331	12,151,522	1.3	13,504,157	11,837,718	14.1	274,773	1,508,228	—81.8
Northeast	5,719,005	3,474,243	64.6	5,320,397	2,910,886	82.8	7,374,174	4,115,224	79.2	—1,655,169	—640,981	.....
Northwest	16,629,985	14,283,342	16.4	14,885,746	12,685,292	17.3	15,782,913	13,443,124	17.4	847,072	840,218	0.8
Trans World	55,611,053	50,218,551	10.7	51,161,649	45,624,227	12.1	55,063,663	47,758,493	15.3	547,390	2,460,058	—77.7
United	78,150,404	69,344,044	12.7	69,732,301	61,770,953	12.9	69,500,823	64,481,512	7.8	8,649,581	4,862,532	77.9
Western	2,001,599	10,280,679	—80.5	1,815,088	9,546,129	—81.0	3,920,561	8,812,895	—55.5	—1,918,962	1,467,784	.....
TOTALS	386,781,385	367,937,493	5.1	351,998,973	335,144,649	5.0	361,256,493	340,336,851	6.1	25,524,892	27,600,642	— 7.5
TERRITORIAL												
Caribair	519,469	482,187	7.7	468,978	438,622	6.9	512,613	409,032	25.3	6,856	73,155	—90.6
Hawaiian	1,519,892	1,488,345	2.1	1,232,800	1,177,246	4.7	1,464,260	1,391,924	5.2	55,632	96,421	—42.3
Trans Pacific	698,118	623,371	12.0	557,684	551,525	11.2	604,310	606,391	— 0.3	93,808	16,980	452.5
TOTALS	2,737,479	2,593,903	5.5	2,259,462	2,167,393	4.2	2,581,183	2,407,347	7.2	156,296	186,556	—16.2
INTERNATIONAL												
American	1,496,849	1,454,737	2.9	1,216,455	1,178,187	3.2	1,652,472	1,419,645	16.4	— 155,623	35,092	.....
Braniff	1,826,529	2,217,089	—17.6	1,603,411	1,690,215	— 5.1	2,144,613	1,931,587	10.0	— 318,084	285,502	.....
Delta	1,368,014	1,625,670	—15.8	1,257,561	1,482,735	—15.2	1,474,913	1,402,680	11.0	— 106,899	222,990	.....
Eastern, Overseas	5,882,836	4,602,362	27.8	5,374,151	4,150,933	29.5	5,351,206	3,603,696	105.5	531,630	998,666	—46.8
San Juan	3,908,122	4,021,519	— 2.8	3,546,463	3,623,792	— 2.1	3,565,327	3,218,017	60.7	342,795	803,502	—57.3
Bermuda	996,825	580,843	71.6	951,044	527,141	80.4	720,178	385,679	86.7	276,647	195,164	41.8
Mexico	977,889	.....	.....	876,644	.....	.....	1,065,701	.....	.....	— 87,812	.....	.....
National	704,474	775,010	— 9.1	629,501	706,024	—10.8	889,402	812,623	9.4	— 184,928	— 37,613	.....
Northwest	8,696,597	7,296,998	19.2	5,814,824	4,716,991	23.3	6,776,548	6,139,086	10.4	1,920,049	1,157,912	65.8
Panagra	4,581,416	4,970,495	— 7.8	3,152,102	3,657,845	—13.8	4,754,120	4,910,899	— 3.2	— 172,704	59,596	.....
Pan American, System	79,926,068	81,742,988	— 2.2	61,791,333	62,829,552	— 1.6	77,802,923	75,732,586	2.7	2,123,145	6,010,402	—64.7
Non-Divisional	.....	—410	.....	.....	.....	.....	— 488	13,511	.....	488	— 13,921	.....
Latin America	21,184,944	22,842,712	— 7.3	15,780,114	17,254,418	— 8.5	23,842,097	23,907,912	— 0.3	—2,657,153	—1,065,200	.....
Atlantic	38,573,594	36,698,147	5.1	31,596,801	29,816,743	10.6	35,164,516	30,926,244	13.7	3,409,078	5,771,903	—40.9
Pacific	19,223,441	20,642,899	— 6.9	13,695,579	14,550,930	— 5.9	17,595,273	18,900,131	— 6.9	1,628,168	1,742,768	— 6.6
Alaska	944,089	1,559,640	39.5	718,839	1,207,461	—40.5	1,201,525	1,984,788	—39.5	— 257,436	— 425,148	.....
Trans Caribbean	NR	.....	.....	NR	.....	.....	NR	.....	.....	NR	.....	.....
Trans World	21,363,587	17,203,285	24.2	17,582,734	13,734,811	28.0	22,336,461	15,622,417	43.0	— 972,874	1,580,868	.....
United	3,779,321	3,435,444	10.0	3,541,775	3,228,718	9.7	3,133,059	2,895,999	8.2	646,262	539,445	19.8
Western	78,774	.....	.....	35,420	.....	.....	252,616	.....	.....	— 173,842	.....	.....
TOTALS	129,704,465	125,324,078	3.5	101,999,267	97,376,011	4.7	126,568,333	113,471,218	11.5	3,136,132	10,852,860	—71.1
LOCAL SERVICE												
Allegheny	2,620,006	2,129,728	23.0	1,514,384	1,365,079	10.9	2,325,003	2,061,335	12.8	295,003	68,393	335.9
Bonanza	1,140,313	809,745	40.8	692,518	472,956	46.4	1,124,873	823,591	36.6	15,440	— 13,846	.....
Central	1,088,482	1,085,018	0.3	432,596	380,014	13.8	1,126,050	1,023,457	10.0	— 37,568	61,561	.....
Frontier	1,835,305	1,593,278	15.2	1,123,995	836,873	34.3	1,835,083	1,659,783	10.6	222	— 66,505	.....
Lake Central	975,619	825,367	18.2	495,683	409,632	21.0	951,198	862,395	10.3	24,421	— 37,028	.....
Mohawk	2,144,573	2,082,984	2.9	1,650,032	1,387,105	18.9	2,198,846	2,077,506	5.8	— 54,273	5,478	.....
North Central	2,984,400	2,418,558	23.5	2,187,303	1,080,089	2.5	3,122,016	2,591,947	20.5	— 135,616	— 173,389	.....
Ozark	2,125,524	2,109,299	0.8	1,292,199	1,086,666	18.9	1,921,476	1,903,210	0.9	204,048	206,089	— 1.0
Pacific	1,702,598	1,530,292	11.3	1,183,026	1,000,913	18.2	1,773,245	1,486,573	19.3	— 70,647	43,719	.....
Piedmont	2,312,292	2,175,176	6.3	1,538,861	1,408,277	9.3	2,188,804	2,073,489	5.6	123,488	101,687	21.4
Southern	1,175,151	1,142,654	2.8	668,742	586,351	14.1	1,244,587	1,119,357	11.2	— 69,436	23,297	.....
Trans-Texas	1,713,329	1,697,413	0.9	858,904	851,734	0.8	1,701,768	1,675,143	1.6	11,561	22,270	—48.1
West Coast	1,181,981	1,102,525	7.2	730,062	657,370	11.1	1,222,907	1,091,809	12.0	— 40,926	10,716	.....
TOTALS	23,001,573	20,702,037	11.1	14,368,315	11,523,059	24.7	22,735,856	20,449,595	11.2	265,717	252,442	5.3
HELICOPTER SERVICE												
Chicago	466,027	317,973	46.6	152,574	56,825	168.5	465,811	310,590	50.0	216	7,383	—97.1
Los Angeles	337,244	331,480	1.7	51,808	45,925	12.8	321,979	290,726	10.7	15,265	40,754	—62.5
New York	606,599	509,956	18.9	162,039	145,371	11.5	715,361	633,781	12.9	— 108,762	— 123,825	.....
TOTALS	1,409,870	1,159,409	21.6	366,421	248,121	47.7	1,503,151	1,235,097	21.7	— 93,281	— 75,688	.....
ALASKAN												
Alaska	1,512,055	1,377,051	9.8	493,608	405,118	21.8	1,501,821	1,427,471	5.2	10,234	— 50,420	.....
Alaska Coastal	396,385	379,354	4.5	211,917	191,724	10.5	378,128	309,215	22.3	18,257	70,139	—74.0
Cordova	213,546	499,581	—57.2	27,136	33,608	—19.3	259,798	457,431	—43.2	— 46,252	42,150	.....
Ellis	301,892	279,278	8.1	136,963	159,298	—16.3	201,213	244,112	—17.6	100,679	35,165	186.3
Nor. Consolidated	534,497	588,018	— 9.1	195,604	211,978	— 7.7	597,909	531,249	12.5	— 63,412	56,769	.....
Pacific Northern	2,578,109	2,495,890	3.3	1,615,854	1,639,042	— 1.4	2,450,351	2,279,143	7.5	127,758	216,747	—41.1
Reeve	541,019	394,371	37.2	276,313	231,931	19.1	403,257	289,612	39.2	137,762	104,759	31.5
Wien	950,482	927,409	2.5	219,672	177,421	23.8	916,178	1,031,267	—11.2	34,304	— 103,858	.....
TOTALS	7,027,985	6,940,952	1.3	3,177,067	3,050,120	4.2	6,708,655	6,569,500	2.1	319,330	371,451	—14.0

NR—Not reported.

WEST COAST TALK

By Fred S. Hunter

Some Executive Personalities—

J. V. Naish, president of Convair, was pursuing a successful career as an investment counselor when he decided to take a job as a mechanic on the wing line at Northrop Aircraft to learn about the aircraft manufacturing business.

William C. House, director of Aerojet-General's systems division, is a prominent member of the Pasadena Art Associates and has won prizes for his paintings.

Harold G. Hynd, v.p. and gen. mgr. of Douglas-El Segundo, was an aviation machinist's mate aboard the old battleship USS New York—And Dr. Jack E. Froehlich, chief of design and powerplants at Jet Propulsion Laboratory and project director of its space program, was a Marine test pilot in World War II and still flies a Cessna 195, in which he owns a half interest.

Some Pilot Personalities—

Scott Crossfield, North American Aviation's X-15 pilot, is a highly entertaining public speaker and in great demand at technical groups. Some sample Crossfield observations: On automatic systems vs. pilots: "A friend of mine says no system will give him competition until someone invents a fraternization circuit."

On high altitude flight: "With no atmosphere to diffuse sunlight, it becomes very bright and the shadows very deep. This is simply remedied by frosted glass in the canopy to diffuse the light. But as this is neither expensive nor very scientific, we install high intensity lighting."

Bob Hoover, customer relations manager for North American Aviation's Los Angeles division, is a top stick and rudder man and, flying in a business suit, can stage a one-man aerial circuit with an F-86 or an F-100 that leaves spectators breathless.

Some Things You See in Print—

Ryan Aeronautical's safety handbook says the rules prohibiting Capri pants, pedal pushers and shorts in factory areas "are not meant to restrict the rights of individuals," but are "to protect and safeguard the welfare of all employes."

Bulletin sent out by J. R. Dempsey, vice president and manager of Convair-Astronautics, for all personnel to read:

1. Do not spill coffee on the floor.
2. If you do, clean it up.

Description of systems engineering in a brochure describing scholastic fellowship at MIT or Caltech, with Ramo-Wooldridge picking up the tab:

"This emphasis is a reflection of the growing need in modern industry for individuals trained to attack and solve advanced design problems which involve complex interactions among various portions of complete systems that require a high degree of optimization to operate successfully."

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WITH THE BEST!

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ALUMINUM POLISH Cleans and polishes unpainted aluminum-clad surfaces in one operation. Non-inflammable, Non-toxic, Non-corrosive to aircraft metals. Will not damage Plexiglas or painted surfaces that are polish-spattered during the cleaning operation.
$2 QT. $4.95 GAL.

WINDSHIELD CLEANER... Non-crazing, Anti-static and Non-inflammable. Especially formulated to clean and polish Plexiglas, Lucite or Sierracin windshields, windows, canopies, helicopter domes or other transparent plastic surfaces. Easily removes service haze, oil spatter, bug and water marks.
$1 PT. $1.60 QT.

DEVELOPED expressly for airplanes and sold only through aviation supply houses. Contact your nearest AIR ASSOCIATES DEALER.

SPEED-GLO POLISH Cleans and polishes all lacquered, enameled or doped fabric aircraft finishes in one easy operation. Formulated to quickly remove service soils and oxidized paint pigments with a minimum of effort and to produce hard, dry, lustrous finish.
$1 PT. $4.50 GAL.

SILICONE GLAZE... Cleans, waxes and protects. Formulated for use on lacquered, enameled and doped fabric finishes. Easily applied and removed. Gives long-lasting protection from service soils, sun, rain. Essential for aircraft not normally kept in hangars.
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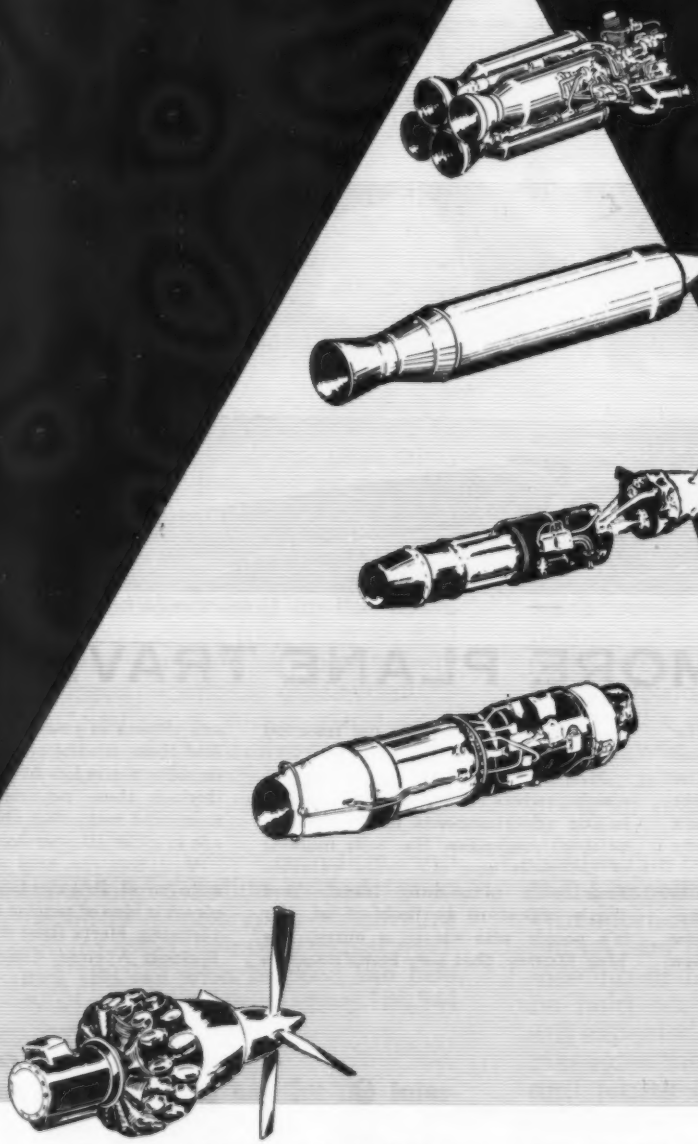

Bendix* has long been a leader in supplying controls and fuel systems for all types of aircraft engines. Today, Bendix is proving to be a natural for new challenges in related missile fields—on ram jets, rockets, nuclear power, and other advanced propulsion systems. So, when it comes to controls, remember that Bendix has the background—and is anxious to share it in solving your problems. *REG. U.S. PAT. OFF.

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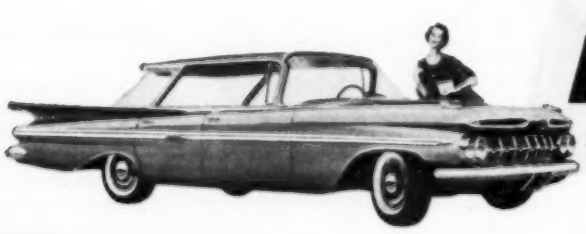
Mrs. Murray is another famous personality who's selling The Hertz Idea in our advertisements in all the top national magazines. She tells millions of prospects how she saves valuable time with plane-auto travel — and that's important to both of us. For it's people who are in a hurry, like Mrs. Murray, that keep Hertz counters and phones in your airports humming. And these are the people who are continually reminded of The Hertz Idea through these advertisements in the most-read magazines and by newspaper ads in cities all over America.

You, too, can help sell more plane-auto travel. Just mention the passenger-pleasing idea of renting a car in your advertising. Hertz Rent A Car, 218 South Wabash Avenue, Chicago 4, Illinois.



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AIRTRENDS

Decision on jet fare level will be reached soon by American Airlines. Company has been conducting extensive studies on whether or not higher fare will be needed on Boeing 707 when service starts Jan. 11.

Airline reconfirmation rule on reservations and minimum time limits for ticket pickup dies Dec. 1 unless Air Traffic Conference takes some action at this week's meeting in Houston. ATC has the item on the agenda. Also scheduled for discussion are proposals to increase travel agents' commissions.

Domestic airlines are re-examining the air travel card plan, looking toward possible widening of its use to include such items as car rentals and hotel charges (bills sent directly to subscribers, not through airlines). American Express announced that its credit card can now be used to buy air travel at Amexco offices and through certain travel agents. Diner's Club is also lining up agents to sell air travel on its card. Airlines say ATP is the best plan in the business and has the best credit rating—default rate is less than ½ of 1%.

Economy class service on the North Atlantic has firmly established itself as the most. During the three months July, August and September the number of passengers choosing to travel economy class outnumbered both first and tourist class passengers combined. Attractiveness of the new low fares, introduced last April, also resulted in a record volume of transatlantic business.

Total traffic from both Canadian and U. S. ports of embarkation added up to 277,944 revenue passengers (including 193,473 who traveled economy class) westbound, and 188,949 who bucked the tide and traveled eastward (including 126,344 economy passengers).

A tide of mounting costs has hit the international airlines at a time when they are striving to hold the line on fares and rates. International Air Transport Association's financial committee warns of prospective increases in Air navigation facilities charges, airport landing fees, higher taxes and insurance rates.

Faced with the threat of substantially higher premiums for hull insurance on the new jets and turbo-props, IATA's insurance subcommittee met recently in London to see if some cooperative, or mutual, insurance scheme could be worked out among the airlines themselves. "Amount of premiums on hull insurance paid by airlines to the insurance companies is tremendous, and very serious consideration should be given to trying to reduce this expense," IATA says.

All of the government aviation agencies—except CAB are working hard to develop a solution to the surplus aircraft disposal question. Several meetings have been held recently, with the Commerce Department taking the lead in trying to find a basis for agreement among airlines, aircraft manufacturers, and those government agencies anxious to dispose of their surplus stocks.

One solution being given serious consideration would be to sell the surplus transport planes—mostly C-46s—abroad. To encourage buyers, the Export-Import bank would grant generous loans on the planes, provided that the buyer's government would guarantee the loan. The buyer would also be required to guarantee that the surplus planes would be used in domestic service exclusively and in particular would be the basis of an application for a foreign air carrier permit.

Considerable progress was made at the New Delhi meeting of the International Air Transport Association towards resolving the jet fare differential question. Another meeting of IATA's traffic conference will be held early in the year. At that time it is expected that a decision will be made to reserve the jets exclusively for first class and tourist class service. Lowest cost—and increasingly popular—economy class service would be available only on piston engine aircraft.

AIRTRENDS

Lack of sufficient passenger traffic may cost some airports loss of scheduled commercial air service. Mayors of 95 municipalities have been placed on notice by the Civil Aeronautics Board that unless the record shows five or more passengers have been enplaned daily at their respective airport terminals, the board may deem further service unwarranted. The warning came as the CAB began a series of investigations to determine whether service to intermediate points on 14 local service airline routes should be continued. The three-year certificates of the carriers authorizing service to the 95 cities involved are due to expire between December 6 and February 10.

An airline passenger origin-and-destination study being conducted by the University of California for the Office of Airports, Civil Aeronautics Administration, indicates that the length of non-stop haul from a given point is in direct ratio to the volume of traffic generated. The more traffic generated by the station, the longer the length of haul from that station. But which comes first? Does the traffic induce the service or the service the traffic? The study does not propose to give the answer since it is directed at determining airport needs in the light of changing and projected air traffic patterns, but the ultimate findings may hold further interesting implications.

Wider taxiways may be one way of meeting the problem of jet engine ingestion. Noting that the outboard engines of commercial jet transports now coming into service extend beyond its 75-foot-wide taxiways, Dallas Love Field is laying asphalt on either side to keep rocks and earth from being blown and drawn into the mouths of the turbine engines.

Flight checks and ground inspections of nonfederal navigation facilities will be made by the Civil Aeronautics Administration at no cost to owners, under an amendment to Part 407 of Civil Air Regulations. Sole exception will be in the case of nonfederal navaids which have not yet been approved or commissioned. The owner will continue to bear cost of CAA flight and ground inspections prior to commissioning of the facility.

FAA administrator E. R. Quesada appears to anticipate enactment of the to-be-reintroduced (vetoed) federal-aid-to-airports bill during the coming session of Congress. Quesada recently called an aviation industry and government officials for recommendations and advice for filling eleven top FAA posts, among them the office of chief, division of airports. In listing the scope of responsibilities of the airport chief, he included administering the federal grant-in-aid program under which, he pointed out, grants to match local funds "recently have ranged between $65 and $70 million annually." Significantly perhaps, he added, "Future rate of grants may range between $50 and $100 million annually."

Airport operators are unhappy about requirements outlined by FAA Administrator E. R. Quesada which would restrict the post of chief, division of airports of the new agency, to a qualified civil engineer. They may have been made aware all to painfully in the past that an engineering approach can limit the concept of airports. Experience has shown, they contend, that a good operations man is better than an engineer in administering an over-all airport program. While a good operations man may combine engineering experience, airport industry spokesmen believe that to place prime emphasis on an engineering background and to make this a basic requirement for the post is a mistake.

Strange sounds are heard more acutely than the familiar and seem disproportionately loud. A helicopter, for example, is actually less noisy than a moving truck or a railroad train when heard at the same distance, according to a study by Bell Helicopter Corp. It's the novelty factor that makes people think the rotary-wing craft is noisier.

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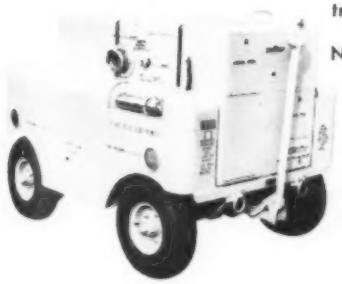

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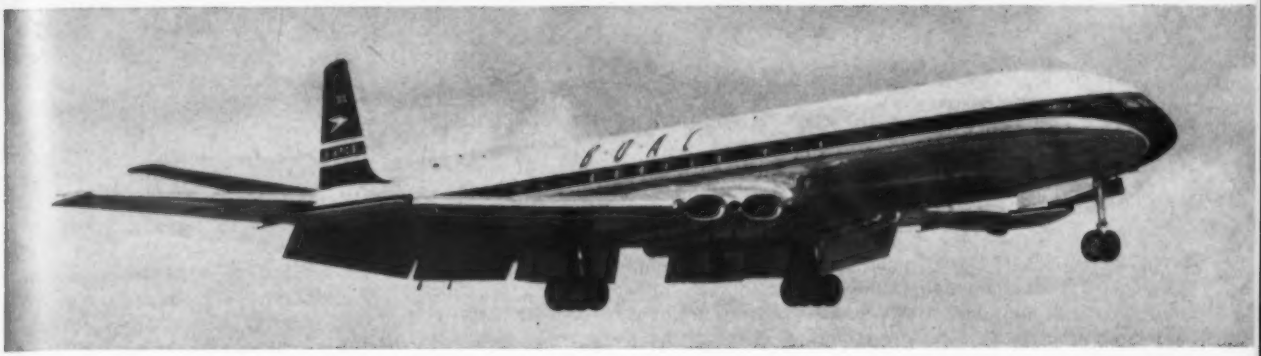


N.Y.-London in 6½ hours:

Flight Report on BOAC's Comet 4

By Eric Bramley
Chief News Editor

LONDON, ENGLAND—Crossing the Atlantic from New York to London on British Overseas Airways Corporation's jet Comet 4 is so fast that it's really just one long meal.

By the time BOAC's cabin attendants had served the usual liquid refreshments, followed by soup, fish and meat courses, dessert, cheese, wines, champagne and brandy, a good part of the 6 hrs. 28 mins. of the flight was behind us. Follow this meal with a short nap, and you're in London.

(The contrast in transatlantic travel these days stood out sharply on the return trip. Against the 6:28 Comet flight, the westbound crossing took 18½ hrs. aboard a slow but comfortable Stratocruiser, which bucked heavy headwinds and which stopped at Keflavik, Iceland.)

The sleek Comet left the runway at New York International Airport at 11:20 a.m. after a takeoff run which we timed at 32 seconds. Initial rate of climb maintained for several seconds after takeoff, to gain altitude specified by the Port of New York Authority, is somewhat breathtaking. The sensation is that of climbing almost vertically. We were told that this climb is at the rate of about 3,000 ft. per minute.

To climb to cruising altitude of 33,000 ft. took 33 minutes, slower than usual due to traffic control. Normally, 29 minutes are needed to reach that altitude.

Gross weight at takeoff was 157,188 lbs., out of 158,000 allowable. The plane carried 68,900 lbs. of fuel (maximum is 71,649). Standard climb to 33,000 ft. consumes 7,275 lbs. Cruising at that altitude at .69 Mach uses 8,025 lbs. per hour. Our cruising speed was somewhat faster, and the Comet at times was consuming somewhat over 9,000 lbs. per hour. On westbound crossings, a refueling stop is made.

• **Seat configuration**—The Comet now has 16 de luxe seats in the forward cabin and 32 first-class seats aft. Meal service is the same, the principal difference in the two classes being that the de luxe passenger ($50 extra fare) has considerably more leg room and a footrest. Seats are on tracks and configuration can be changed easily. Possibilities, for example, are 40-seat de luxe, 56 first-class, 71 tourist, 81 economy. One galley is forward of the de luxe compartment, the other in the rear of the plane. The forward unit is the main service point. Two toilets are located forward and two aft.

One Comet is now fitted with a drop-out oxygen system. Masks are in racks above passengers' heads and are automatically ejected if cabin pressure becomes 14,000 ft. All other Comets, which now have masks under the seats, will be changed to the drop-out system.

• **Crew complement**—A Comet crew includes pilot, copilot, engineer and navigator, and there were two stewards and two stewardesses. In mid-October, BOAC had 21 captains fully trained on Comets, all of whom had made at least eight Atlantic flights before once-weekly service started. These captains had also flown either the Comet 1 or 2E, or both, and all have over 1,500 hrs. jet time. Capt. Rodley, for example, had 1,900 hrs. Several days before Nov. 14, starting date for daily service, 26 captains were fully trained.

BOAC officials in London are emphatic that the Comet's present cockpit crew is entirely adequate. They have no plans for adding a pilot or for having a pilot-trained engineer.

BOAC's pilot contract provides basic pay, aircraft type differential based on weight and speed, and crew complement pay. Under the latter provision, it was explained, pilots are paid extra for relieving engineers and navigators on long flights (also for handling radio in place of the radio operator, no longer carried except on Stratocruisers).

• **Speed cuts pay**—This can result in Britannia and DC-7C pilots earning more than Comet pilots, a BOAC official said. This is because the Comet's speed makes relief of engineers and navigators unnecessary, and the pilots, therefore, receive no extra pay. An experienced Comet pilot incidentally, will earn "a little over 4,000 pounds ($11,200) a year," this official said.

New Comet pilots undergo a five weeks' study course, of which three weeks are on the plane and the Rolls-Royce Avon engine, two weeks on flight planning, cruise control, etc. Transition flying is about 10½ hrs. plus 1½ hrs. for a check flight. The pilot then goes on scheduled service, but for the first 75 to 100 hrs. he is "in command under supervision," says Capt. Tom Stoney, BOAC's Comet flight manager.

There is no doubt that the British wanted very badly to be first on the Atlantic with jets. Some have contended that the Comet 4 was rushed into service too fast on Oct. 4. But, the British point out, they had the planes. They had 21 pilots with 1,500 or more hours and each with eight Atlantic crossings. So, why wait?

(Transport Aviation cont'd on p. 60)

Polar Flight—The Short Route

KLM becomes third airline to fly Europe-Japan over the North Pole; route cuts 30% from time via India

By Anthony Vandyk
International Editor

TOKYO—With the inauguration of KLM Royal Dutch Airlines' polar service from Amsterdam, November 1, three carriers now link Europe with Japan by the short Northern route. And the high load factors experienced by Scandinavian Airlines System, which pioneered commercial polar operations, and Air France reflect the favorable passenger reaction to the new route. KLM reported capacity bookings for its first few polar flights.

Why is the polar route so popular? Mainly, because it represents a 30% saving in time over the "traditional" Southern route. Flying time averages some 30 hours and there is normally only one intermediate stop—at Anchorage, Alaska.

On the Southern route, not only is the flying time longer but there are many more intermediate stops. To the tourist who has never been in Asia before there is some attraction in stopping at such glamorous-sounding places as Karachi and Calcutta.

But seasoned travellers are aware that there is little pleasure in having to land at intermediate airports in Asia. All too often these calls mean visas and shots even though the passenger is merely in transit. The airports are usually hot and uncomfortable, and, during the monsoon season, flying conditions are so bad the "fasten seatbelts" sign comes on all too frequently. By contrast, on the northern route the air is clear and smooth all the year round.

Normally flights between Europe and Anchorage pass a few hundred miles south of the North Pole, but the track is always far north of that followed by aircraft flying the original so-called polar route—from Europe to the U.S. West Coast—which often does not pass north of the Arctic Circle.

Operationally the polar route presents few problems. The Douglas DC-7Cs used by SAS and KLM and Air France's Lockheed L-1649s usually make the flight from Europe to Anchorage nonstop although sometimes a refueling stop has to be made at one of the northern Scandinavian airfields. Although the route passes over very remote regions the aircraft are never more than two hours away from an airfield. And, an emergency landing on ice, although not all that easy, is obviously far more desirable than a sea ditching. Aircraft on the polar route carry large quantities of survival equipment and all crews have to undergo special training in cold-weather living. (Some of the KLM crews started their training by taking up temporary residence in the airline's frozen food chamber at Schiphol airport!)

The main problem of polar flying is in navigation. According to KLM, Normal charts on Mercator projection cannot be used north of latitude 70 deg. because of distortion. Radio communications are frequently upset by electromagnetic and atmospheric disturbances and the magnetic compass is unreliable within an area of some 1,200 miles around the magnetic North Pole.

To solve the problem KLM uses a special chart for polar navigation. The area in the vicinity of the North Pole is projected without undue distortion. Instead of a magnetic distance compass, which is useless during part of the polar flight, the aircraft is equipped with two gyro compasses that can derive their directing force either from the earth's magnetic field or from gyroscopes. A constant check on the proper functioning of these gyro compasses is provided by the periscopic sextant as well as a Kollsman polarized sky compass with which the direction of the sun can be determined even when it is several degrees below the horizon.

One thing on a polar flight that never fails to cause interest and discussion is the change of time. For example, the flight which leaves Amsterdam at 10:40 p.m. on Wednesday arrives at Anchorage at 4:25 a.m. local time on Thursday after having flown for 16 hrs 45 min. Anchorage is 11 hours behind Amsterdam time. The aircraft then leaves Anchorage at 5:25 a.m. (4:25 p.m. Amsterdam) on Thursday, loses a day crossing the international date line, and arrives in Tokyo at 1:35 p.m. on Friday after flying for 13 hrs and 10 mins.

Eastbound, the situation is even more confused. Leaving Tokyo at 4:25 p.m. on Saturday, the aircraft crosses the international dateline and arrives at Anchorage at 8:50 a.m. the same day—theoretically before it took off from Tokyo. Taking off from Anchorage at 9:50 a.m. (8:50 p.m. Amsterdam) the plane reaches Amsterdam at 1:35 p.m. after 16 hrs. and 45 mins. flying.

KLM serves its meals according to "stomach time" . . . that is, normal meal times in terms of the point of departure. This looks somewhat strange on paper. For example, dinner is served westbound out of Anchorage where the aircraft took off at 5:25 a.m. local time. And eastbound passengers are served their supper of cold lobster shortly before the plane touches down at Amsterdam—1:35 p.m. local time.

PAA Obtains $130 Million, Completes Jet Borrowing

A three-year $130 million revolving credit, described as the biggest financing arrangement ever made by an airline, has been obtained by Pan American World Airways to complete its jet borrowing program.

The deal involves 39 banks in 17 cities, with New York Trust Co. as agent. The agreement provides that, until June 30, 1961, PAA may borrow and reborrow in whole or in part on a revolving credit basis, and loans may be repaid semiannually in equal installments in three, four or five years, at the company's option.

PAA also has long-term obligations totaling $90 million with a group of insurance companies.

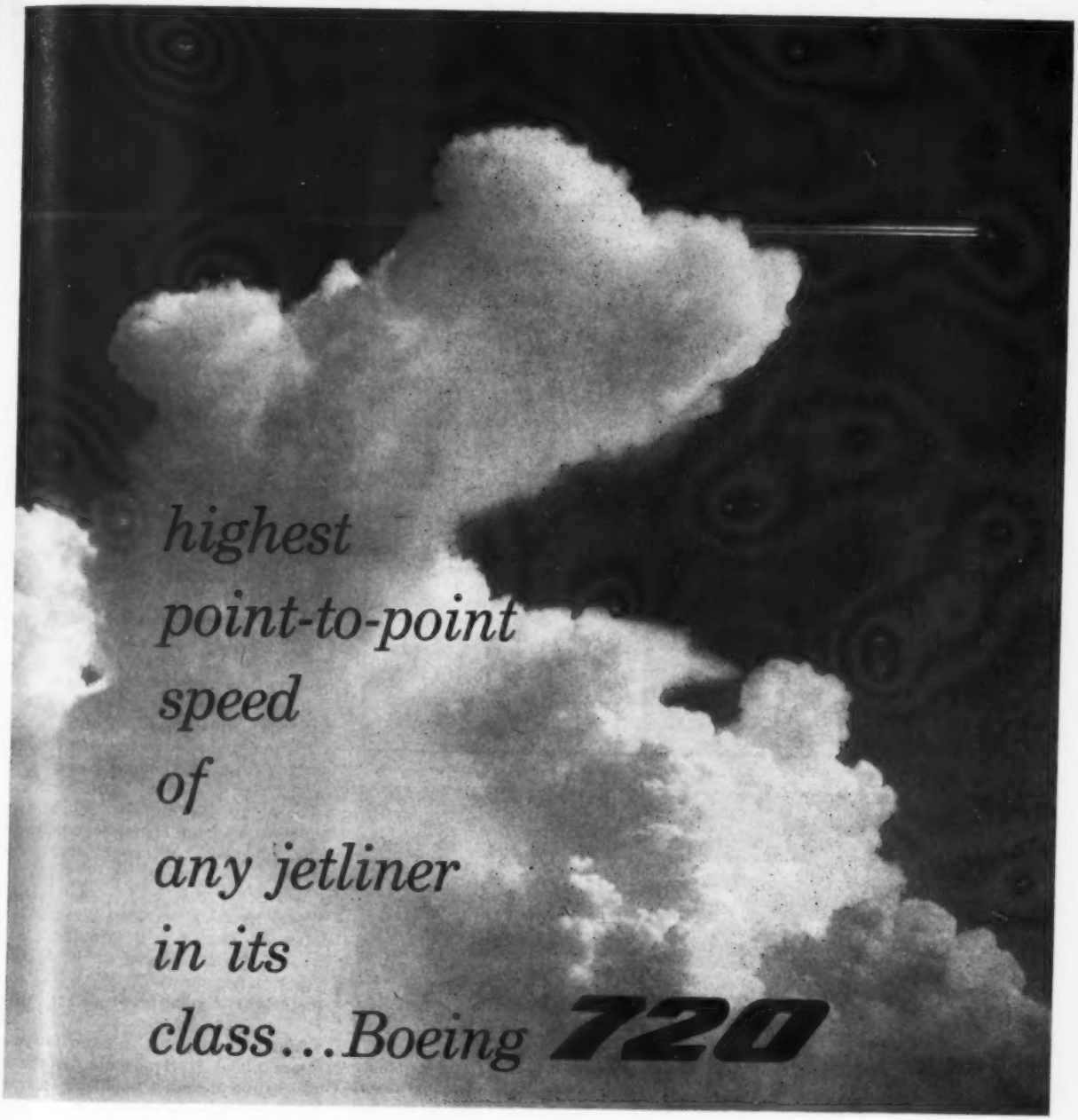
The company has on order 44 new jets, 23 from Boeing and 21 from Douglas, representing an investment of about $280 million. Three Boeing 707s have been delivered, with three more expected before the end of the year. The first DC-8 is not expected until late 1959.

CAB to Investigate Adequacy Of Coach Service Offered

The Civil Aeronautics Board is "increasingly concerned with the complete lack or token volume of coach service in many of the country's top passenger-generating markets" and has ordered an investigation into the adequacy of coach service now being offered the public. Markets to be studied are those between New York, on the one hand, and Washington, Chicago, Buffalo, Cleveland, Syracuse, Rochester, Providence, and Cincinnati.

Only a limited number of cities will be investigated to avoid bogging the study down in an unwieldly mass of detail. The Board noted that the carriers have never made clear what criteria they use to determine the best volume of coach service to be offered.

In the case of the markets to be investigated, the Board pointed out



The short-to-medium range Boeing 720 has a higher point-to-point speed than any other jetliner in its class. By increasing the angle of sweep-back of the inboard wing, Boeing stepped up the 720's cruise speed to 614 miles an hour, and its Mach limitation number to .90.

Sister ship of the CAA-certified 707, the 720 incorporates design advances based on a continuing prototype flight-test program. The 720 incorporates, also, all of the advantages of the experience Boeing gained in building over 1600 large, multi-jet aircraft—more than any other company in the world.

These airlines have ordered Boeing 707 and 720 jetliners:

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B.O.A.C. • BRANIFF • CONTINENTAL
CUBANA • LUFTHANSA
PAN AMERICAN • QANTAS • SABENA
SOUTH AFRICAN • TWA
UNITED • VARIG • *Also* MATS

BOEING 720

that Buffalo, Syracuse, Rochester and Providence now have no coach service and the number of coach flights offered in the other four cities "raises an initial adequacy of service question."

Carriers made party to the proceeding are American, Braniff, Capital, Delta, Eastern, Mohawk, National, Northeast, Northwest, TWA and United, although all domestic carriers are expected to feel the effects of any Board decision in the case.

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Ex-Im to Help Alitalia Buy DC-8s and Link Simulator

Export-Import Bank will participate with Douglas Aircraft Co. and Link Aviation in financing the $24-million sale of four DC-8s and a Link electronic flight simulator to Alitalia, Italian airline.

Alitalia will pay $6 million down, and the balance will be financed with a $13.7-million credit from Eximbank, $4,098,000 from Douglas and $202,000 from Link. The credit will be repayable in 13 semiannual installments commencing in 1961.

. . . Transport Briefs

• **707 certification extended**—CAB extended until Feb. 14, 1959 the termination date of the authority under which Boeing 707-100s may be operated as provisionally certificated aircraft by airlines in their training and simulated air carrier operations.

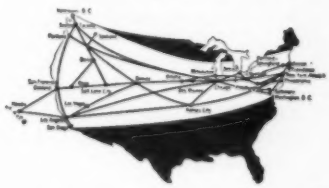
• **PAA employes cutback**—Pan American World Airways said it was furloughing about 150 employes at its Miami overhaul base. Reason: the "runaway competitive situation in Latin America" which has decreased workloads and reduced manpower requirements. PAA has consolidated some flights, and will allow Latin American affiliates to do more of their own maintenance and engine overhauls to take advantage of lower labor costs abroad.

• **New aircoach service**—Western Air Lines on Dec. 1 will introduce daily DC-6B aircoach service on its Mexico City-Los Angeles route. WAL will also continue its regular first-class service.

• **Agent commission hike deferred**—International Air Transport Association said its members are unable to increase travel agents' commissions at this time because of "small profit margins of their own operations."

• **FAA incorporates AMB**—Airways Modernization Board has been incorporated into the new Federal Aviation Agency, as provided under the Federal Aviation Act of 1958. AMB was formed in 1957 in recognition of the necessity of modernizing the nation's aviation facilities.

• **Passenger-cargo F-27 delivered**—Northern Consolidated Airlines, Alaska, took delivery on its first passenger-cargo Fairchild F-27B. It is the first F-27 equipped with a big cargo door and a movable forward bulkhead.

No wonder connecting airlines route many of their passengers via United. United offers weather-mapping radar on every plane. Luxurious Red Carpet* Service on DC-7s. Exclusive DC-7 Custom Coach flights with hot meals included in the low fares. Convenient schedules along a Main Line route  covering 80 cities coast-to-coast and Hawaii, with over 800 flights each day.

UNITED AIR LINES

*Red Carpet is a service mark owned and used by United Air Lines, Inc.

CAB Report & Forecast

• **Passenger fare investigation**—For the fifth time in the two-year-old General Passenger Fare Investigation, CAB's Bureau of Air Operations has changed its mind about what constitutes a "proper" level of air fares. Current party line at the Bureau is that the present fares are too high and should be cut back by 3.27% as soon as the Board rules in this case; then similar cut should be made effective July 1, 1960.

Basis for Bureau Counsel's contention is its insistence—in the face of a mountain of testimony to the contrary—that the U.S. trunk lines have their jet re-equipment program well in hand with most of the orders placed, adequate financing arrangements made and more than sufficient earnings at present fare levels to meet their earnings needs. The carriers, in their final briefs to the examiner, take vigorous issue with this argument and point out the urgent need for an additional 6-12% fare increase.

• **St. Louis-Southwest Case**—By granting a St. Louis-Miami route to TWA the CAB has in effect prejudiced any decision it might make in the pending Southern Trans continental case, Eastern Airlines argued in a petition for reconsideration of the Board's decision in the St. Louis-Southeast Service case. National, Delta and American joined in asking reconsideration of this and other parts of the decision.

• **Alaska cuts loan request**—Since the CAB never formally advised Alaska Airlines of its decision to turn down a $3 million equipment loan guarantee, the carrier, after a series of drawn-out private conferences with the Board's staff—who had recommended approval of the original loan—had cut its loan request to $1.5 million. If approved, the proceeds will be used to buy a DC-6.

• **Board shorties**—Today, November 17, at 10 a.m. in room E-210, the Board reopens that pandora's box known as 'The Pan American Mail Rate Case," Examiner is Paul Pfeiffer . . . What ever happened to the Board's urgent and expedited consideration of the all-cargo carriers for subsidy eligibility? . . . CAB approval of the Pan American-National short term jet equipment lease, on a conditional basis paves the way for the first domestic test of the relative customer-appeal of jets vs turboprops, for Eastern will start Lockheed Electra service N.Y. to Miami next month.

TECHNICAL TIPS

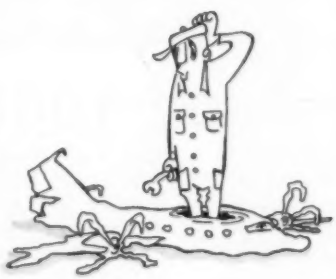
Upside-Down Tools Make UAL's Maintenance Jobs Easier

United Air Lines overhauls about 1,500 engines per year at its San Francisco facility and, accordingly, has a production-line setup. But one has to stand on one's head to recognize some of the tools being used.

A good example of this is the inverted installation of a Rockwell-Delta drill press (left) used for reaming seat bosses in engine cylinders. The workholding fixture is made of a step block attached to the drill press column, and a collar around the protruding spindle. The cylinder is set on the fixture, and the operator feeds the spindle with a large handwheel substituted for the standard feed arm. About 18,000 cylinders are processed per year, and conventional positioning requires a complex holding fixture.

Another setup (right) is credited with cutting oil cooler tube swaging time in half. Here, a modified drill press is used instead of a portable pneumatic swaging tool. There are 4,528 tubes in a DC-6 oil cooler, and 6,419 in a DC-7 oil cooler. On the average, 1,500 tubes are replaced on each overhaul, and United is able to install some 250 per hour with the drill press.

Be Careful With Mercury—It Can Make a Mighty Mess



According to the National Safety Council, increased quantity of mercury being air shipped these days is becoming a problem aboard air transports. The Council cites a recent instance of mercury damage which cost the operator well over $100,000 in repairs.

It seems that, because a larger-than-usual amount spilled from a broken container, silver strips, rather than a vacuum cleaner, were used to attract the elusive element. The strips scratched the anodizing on the dural aircraft structure, and the mercury went to work eating holes in the exposed metal. Major structural components had to be replaced.

A sidelight to this is that a mechanic who had worked at removing the mercury, later was on a job safetying with brass wire. Every time he tried to pigtail the wires, they broke. Apparently, the agitated mechanic was fast becoming a firm believer in gremlins. His sanity was saved only by the discovery that his fingers had absorbed some of the mercury, now reacting with the brass.

The Council points out that there are 10 types of mercury and that, according to one aircraft manufacturer, any of them is harmful to aircraft. Attempts are being made to embargo any shipment containing mercury, but it's suggested that, until this is accomplished, each operator should educate personnel handling and accepting such shipments as to its policies in the matter.

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SOUTHERN AIRWAYS' Casey Britt and WWP at Eglin Field, Fla.

EN ROUTE

Wayne W. Parrish

Knocking Off Four More Airports . . . The Hard Way!

I went to Miami in mid-August to talk to over 400 members of the Pan American Management Club so I knocked off four new airports going and returning.

You gotta be crazy to do this, but I qualify. To go to Miami I went west from Washington to Louisville, Ky., on an evening Eastern flight. Smooth and uneventful until we got to the outer marker before landing. Captain R. T. Paxton, the Martin 404, me and the passengers, all reached Louisville at the same time as a terrific electrical storm. The rain came down in sheets.

Stayed overnight at the very fine Standiford Motel a short distance from the terminal on the airport grounds. Telephone in the terminal and fast pick-up service. Can recommend this place for sure. And congratulations to Louisville for those two extra-wide, meticulously clean air-conditioned fingers leading to all the gates. Solved the traffic jam in the main concourse—an excellent job of planning which others could well use. (Wonder why so many terminal architects know so little about terminal traffic?)

Up early next morning for the 8 a.m. Eastern #287 for Atlanta, but had awfully tough luck. Had wanted to hit Bowling Green, Ky., but for two days the runways were being resurfaced, so no stop. Such breaks as this have more than once almost caused me to give up this hobby of collecting airports.

So on to Nashville where Bill Webb, Eastern operations manager, and Ann Magruder, secretary, bid me welcome and I had a fine cup of coffee with Webb in the always-reliable Skychef's coffee shop.

Nashville's a place to watch. Building one brand new 10,000-foot runway and extending another to 10,000 feet, both with over-runs, and a new terminal is under way for opening in early 1960. Here's one progressive city that's getting ready for jets.

So back on Eastern while Captain Ralph Kennedy, Pilot M. B. Johnson, Jr., and a very good attendant, Virginia Detzman, took me over lush green country that became picturesque and hilly, to Chattanooga, and on to a new stop I've been after for years—Rome, Ga.

Word of my coming had preceded me. On hand were Bob McSpadden, James Scarborough, I. C. Sieving and Barry Wright, all prominent business men who are members of the Chamber of Commerce aviation committee. Also Leroy Hancock, city commissioner, and Milton O. Fletcher, manager of the Chamber. Mighty nice of them to come out.

At Atlanta I had a fast switch. Eastern's John Janisch turned me over to Southern's Casey Britt, v.p.-traffic and sales, who hustled me over to Frank Hulse, Southern's president, for a quick tour of the offices. Then for a fast sandwich at the Dobb's House eating spot in the terminal; then Grady Ridgeway, assistant airport manager, gave me a quick preview of the new terminal site and ramp construction; and then Casey and I hopped on a Southern DC-3 for the last two stops on his system (as of August).

First came Dothan, Ala., and then to Eglin Field, Fla., home of the big USAF base where Southern is very popular and does a fine business. Met by Col. Frank Jamison, Maj. John House and Capt. Mack Seacord, who took Casey and me to pay a call on Maj. Gen. Joe Kelly, the new C.O. at Eglin.

Then back to watch Bill Rowley, Southern's local manager trying to check in a plane-load of passengers in the tiny terminal, and off I went back to Dothan with Capt. Ben T. Epps, First Officer David Seitz, and Stewardess Edna Wells. On board was Dick Loudon of Boeing.

Had an hour and a half to wait at Dothan for Eastern's southbound #181, a Convair for Miami, but the wait was painless. Southern's J. O. Lasseter, who handles sales out of Columbus, Ga., Bill Yarbrough of Eastern, and Grady Thrasher, who runs Southern's test and development division operating a maintenance contract for Army aviation at Fort Rucker, took me to the Dothan country club for some refreshments.

At Tallahassee who should get on board but Harry Copland, aeronautics director for Florida since early summer, who has just about the longest record of continuous occupation in U.S. aviation—47 years. Harry is a remarkable guy. You'd never believe it to see him that he soloed in 1911. He checked out in a T-33 jet trainer in 1956. He's a retired USAF colonel, has been in everything from manufacturing to fixed base.

At Tampa I was called off the plane and interviewed for a local TV program. Finally got to Miami late that night and turned in at Art Bruns' good Miami Springs Hotel and Villas, after renting a car from National Car Rental System.

Returning to Washington, I went first to Atlanta for a 24-hour stop-over with Delta's C. E. Woolman (where I gorged on Pecos cantaloupes and fresh tomatoes), and then took an Eastern local to Columbus, Ga., Birmingham and Muscle Shoals—a new stop and next to last on the EAL system—which serves this rich industrial and agricultural area near the Muscle Shoals Dam.

Bill Mays of WVNA interviewed me by tape with assists from John Howell, airport manager, who operates the Tennessee Valley Flight Service (crop dusting, charters, etc.), while Robert Thornberry of CAA and LeRoy Couch of Eastern looked on.

Back in Nashville, we arrived toward the end of a whopping air show. Val Smith, ex-Capital pilot now in the insurance business (now that's a switch!), took me over to meet Brig. Gen. Howard Butler and Brig. Gen. John Gifford, both ANG officers, who had arranged the show. Smith is a terrific aviation booster for Nashville. Then Hal Gaines, Eastern's sales manager, took me over until I boarded an American Convair for a fine evening flight through clear skies to Washington, during which I had a good chat with Captains Dick Jacobsen and Art Arthur.

AT DOTHAN, ALA., Mayor Frank Gwaltney greets author. At left is Jim Lasseter, d.s.m. for Southern. Right, W. R. Yarbrough, Eastern manager, and Hugh Wheelless, airport manager.

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